

**TECHNICAL MANUAL
OPERATOR'S MANUAL**

**MULTIPLE INTEGRATED LASER
ENGAGEMENT SYSTEM
(MILES 2000)**

TACTICAL ENGAGEMENT SIMULATION SYSTEM (TESS)

FOR

**ASSAULT AMPHIBIOUS VEHICLES
AAV-P7**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

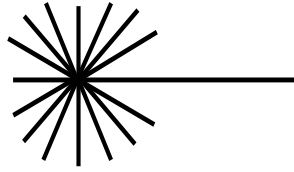
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UNITED STATES MARINE CORPS

02 JULY 2002



LASER WARNING

Suitable precautions must be taken to avoid possible damage to the eye from overexposure to radiated laser energy. Precautionary measures include the following:

- **NEVER fire the laser** at personnel within 10 meters.
- **NEVER look at the laser transmitter** through magnifying optics such as binoculars, telescopes, or periscopes at ranges less than 40 meters.

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SAFETY SUMMARY

WARNING

- Personnel can be killed or injured by turret movement. Never install or remove MILES 2000 equipment unless **TURRET TRAVERSE LOCK** is **LOCKED** and the **VEHICLE MASTER POWER** switch is **OFF**.
- To prevent personal injury, turn all system power to the equipment off, including the CU, before conducting any removal/replacement procedures.
- DO NOT load MILES-equipped weapons with live ammunition or the wrong blank ammunition. IMPROPER AMMUNITION may cause FATAL INJURIES. Refer to the associated weapons technical manual for information on the use of blank ammunition.
- Never touch the vehicle exhaust equipment when installing or removing MILES 2000 equipment. The exhaust can be very hot and cause severe burns.

FIRE/EXPLOSION WARNING

- Tape primer is toxic and highly flammable. Do not spray near heat, open flame, or sparks. Use primer only in well ventilated areas. Do not permit smoking in the area. Injury to personnel may result.

CAUTION

- Any batteries or otherwise hazardous materials replaced as routine maintenance should be disposed of in accordance with local procedures.
- Do not spill fuel on detector belts or fastener tape. Fuel dissolves the adhesive properties of the tape primer and may cause a detector belt to fall from the vehicle, causing damage or loss of a detector belt.
- Equipment that is emerged in saltwater requires fresh water rinse to prevent equipment damage.

For information on **FIRST AID**, refer to **FM 21-11/MCRP-3-02G**.

HOW TO USE THIS MANUAL

INTRODUCTION.

This manual contains operation instructions for the Multiple Integrated Laser Engagement System (MILES 2000), Tactical Engagement Simulation System (TESS), when configured on the Assault Amphibious Vehicles (AAV-P7).

MANUAL DESCRIPTION.

This manual is divided into three chapters. Chapters are further divided into sections. The chapter descriptions are provided in the following subparagraphs:

Chapter 1 is an introduction that describes the MILES 2000 equipment and how it works. It also contains a list of abbreviations.

Chapter 2 provides operating instructions on the MILES 2000 equipment for the AAV-P7.

Chapter 3 describes how to troubleshoot and maintain the equipment. MILES 2000 equipment does not need operator maintenance or lubrication, except for external cleaning after use.

CHAPTER 1 INTRODUCTION

SECTION I. GENERAL INFORMATION

1.1 SCOPE.

This manual describes how to install, operate, and maintain the Multiple Integrated Laser Engagement System (MILES 2000) Tactical Engagement Simulation System (TESS) when configured on the Assault Amphibious Vehicles (AAV-P7). The manual also explains all authorized operator maintenance. Refer any maintenance problems not covered to organizational maintenance personnel.

1.2 MAINTENANCE FORMS AND RECORDS.

U.S. Marine Corps (USMC) personnel will use Technical Manual (TM) 4700-15/ __, Equipment Record Procedures, and refer to the on-line MCPDS or Marine Corps Stocklist SL-1-2, Index of Technical Publications.

1.3 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRS).

If your MILES 2000 equipment for the AAV-P7 System needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on a Quality Deficiency Report. Mail to us at Commander, Simulation, Training, and Instrumentation Command (STRICOM), ATTN: AMSTI-OPS-L; 12350 Research Parkway, Orlando, FL 32826-3276. We'll send you a reply. For USMC personnel, submit SF-368 in accordance with MCO 4855.10 (Quality Deficiency Report) to: Commander, Marine Corps Logistics Base (Code G316-1), 814 Radford Boulevard, Albany, GA 31704-1128. We'll send you a reply.

1.4 CORROSION PREVENTION AND CONTROL.

- a. Corrosion Prevention and Control (CPC) of material is a continuing concern. It is important that any corrosion problems with this item be reported, so that the problem can be corrected and improvements can be made to prevent the problem in the future.
- b. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.
- c. If a corrosion problem is identified, it can be reported using form SF-368. Use of key words such as "corrosion," "rust," "deterioration," or "cracking" will ensure that the information is identified as a CPC problem.
- d. The form should be submitted to Commander, Simulation, Training, and Instrumentation Command (STRICOM), ATTN: AMSTI-OPS-L; 12350 Research Parkway, Orlando, FL 32826-3276. USMC personnel, submit SF-368 in accordance with MCO 4855.10 (Quality Deficiency Report).

1.5 PREPARATION FOR STORAGE OR SHIPMENT.

When receiving equipment for storage or shipment, always inspect the returned equipment for damage, breaks, cracks, and cleanliness.

1.6 LIST OF ABBREVIATIONS AND GLOSSARY.

Refer to Table 1-1 for the list of abbreviations used with the MILES 2000 System, and refer to Table 1-2 for the Glossary.

Table 1-1. List of Abbreviations.

AAV	Assault Amphibious Vehicle
AC-DC	Alternating Current/Direct Current
ASAAF	Automatic Small Arms Alignment Fixture
ATWESS	Anti-Tank Weapons Effects Signature Simulator
AVCPS	Audio Visual Cue Pyrotechnic Simulator
BFA	Blank Firing Adapter
BIT	Built-In-Test
CD/TDTD (Controller Gun)	Controller Device/Training Data Transfer Device (Controller Gun)
CDA	Control Display Assembly
CPC	Corrosion Prevention and Control
CSWS	Crew Served Weapon System
CU	Control Unit
CVC	Combat Vehicle Crew
CVS	Combat Vehicle System
DC-DC	Direct Current/Direct Current
DPCU	Data Processing Control Unit
EIR	Equipment Improvement Recommendation
EOD	Explosive Ordnance Disposal
FCU	Fire Control Unit
FlashWESS	Flash Weapons Effects Signature Simulator
FU	Firing Unit
ID	Identification
I/O	Input/Output
IR	Infrared
ISU	Integrated Sight Unit
ITS	Independent Target System
IWS	Individual Weapons System

Table 1-1. List of Abbreviations - Continued.

IWS Console (DPCU)	Individual Weapons System Console (Data Processing Control Unit)
KSI	Kill Status Indicator
LAV	Light Armored Vehicle
LASER	Light Amplification by Simulated Emission of Radiation
LED	Light Emitting Diode
LTU	Laser Transmitter Unit
LU	Loader Unit
MARS	MILES After-Action Review System
MCS	Master Control Station
MG	Machine Gun
MGS	Missile Guidance System
MGSS	Main Gun Signature Simulator
MILES	Multiple Integrated Laser Engagement System
O/C	Observer/Controller
OTPD	Optical Turret Positioning Device
PID	Player Identification
Pk	Probability of Kill
PMCS	Preventive Maintenance Checks and Services
PROM	Programmable Read-Only Memory
SAT	Small Arms Transmitter
SMAW	Shoulder-Mounted Assault Weapon
SWS	Surrogate Weapons System
TAMMS	The Army Maintenance Management System
TESS	Tactical Engagement Simulation System
TM	Technical Manual
TNB	Turret Network Box
ULT	Universal Laser Transmitter
USMC	United States Marine Corps
V	Volt
Vac	Volts Alternating Current
Vdc	Volts Direct Current

Table 1-2. Glossary.

Administrative Kill	A kill initiated by the CD/TDTD (Controller Gun) for administration purposes.
Automatic Small Arms Alignment Fixture (ASAAF)	Device used to align the Small Arms Transmitter (SAT) to the sights on a weapon.
Catastrophic Kill	A kill that totally disables a vehicle or individual.
Cheat Kill	A kill is assessed to a system when a tamper attempt has been detected.
Commo Kill	A kill that disables external communications.
Controller	An umpire or referee in a MILES 2000 training exercise.
Controller Device (CD/TDTD) (Controller Gun)	A device used by the Controller to upload, download and test the MILES 2000 system.
Fastener Tape	A hook and pile type tape used to hold vehicle detector belts and other MILES 2000 equipment in place.
Firepower Kill	A kill that disables vehicle weapons.
Helmet Harness	The part of the IWS attached to the helmet or soft cover.
Hit	Simulated contact with incoming fire that does not result in a Kill.
Individual Weapons System (IWS)	The Helmet and Torso Harness assemblies and IWS Console (DPCU), which is worn by personnel. This equipment also includes the Small Arms Transmitter (SAT).
Kill	Refer to Catastrophic Kill, Commo Kill, Firepower Kill, or Mobility Kill
Kill Status Indicator (KSI)	A device attached to a vehicle that produces an external flashing light indicating a Hit, Near Miss or Kill.
LASER	Light Amplification by Stimulated Emission of Radiation. A narrow beam of light capable of transmitting information.
Laser Beam	In MILES 2000 equipment, an eye-safe, invisible beam of light that simulates weapons fire.
Laser Detector	A device that senses incoming laser beams.
Laser Transmitter	A device that transmits a laser beam.
Main Gun Signature Simulator (MGSS)	A device that produces a flash and bang to simulate main gun firing.
Mobility Kill	A kill that disables the vehicle movement. The crew has 20 seconds to bring the vehicle to a stop. If motion is sensed after the 20 seconds, a Cheat Kill will occur.
Near Miss	Laser fire close enough to be sensed by a laser detector, but not close enough to cause a Hit or Kill.

Table 1-2. Glossary - Continued.

Optical Turret Positioning Device (OTPD)	A device that provides an optical reference signal to the turret detector belts (on applicable vehicles) to determine the turret position with reference to the hull.
Reset	Brings the system to the ready (alive) condition. In a Combat Vehicle System (CVS), the reset brings the system to a ready condition and returns ammunition to the default levels.
Resurrect	When a CVS is resurrected, the system is brought to a ready condition, but the ammunition levels remain as they were when the system was killed.
Small Arms Transmitter (SAT)	A laser transmitter used on various individual and vehicle-mounted rifles and machine guns.
Torso Harness	The part of the IWS that is worn on the upper body.
Universal Laser Transmitter (ULT)	A laser transmitter used on various combat vehicle systems mounted on the main gun and the coax machine gun.
Weapon Token	Is embedded in software and allows the IWS Console (DPCU) to enable a SAT. The Weapon Token is transmitted to the IWS when the system is reset/resurrected by the CD/TDTD (Controller Gun). The SAT cannot be enabled without a Weapon Token and will not have one in the following conditions: system is killed or another SAT is enabled with the same Torso Harness.

NOTE

Vehicle kits contain the SATs for the vehicle mounted weapons, but do not include IWS SATs. IWS equipment is issued separately. See appropriate IWS TM for operator and maintenance of SAT.

1.7 SAFETY, CARE, AND HANDLING.

Before, during and after operation of equipment, read and adhere to all applicable WARNINGS and CAUTIONS. Perform all preventive maintenance checks and services as scheduled, and report any discrepancies as soon as possible. Use the proper tools and procedures for installation, troubleshooting, removal and replacement of components, and notify higher echelon maintenance personnel when warranted.

Although MILES 2000 consists of ruggedized equipment designed to withstand extreme vibration, shock, and environmental stresses. Treat the equipment with reasonable care. Do not use excessive force when handling, packing, or stowing equipment. Responsible handling and use will help prolong the life cycle and appearance of the equipment.

SECTION II. EQUIPMENT DESCRIPTION AND DATA

1.8 EQUIPMENT CHARACTERISTICS.

The MILES 2000 system permits the vehicle and crew to take part in realistic combat training exercises. Actual firing conditions of all vehicle weapons are simulated using laser beams. Blank ammunition adds to the system's realism.

Laser detectors, mounted on the AAV-P7 vehicles and worn by crew members, sense enemy fire. The MILES 2000 system electronics determine the accuracy and simulated damage of incoming fire. The system also detects the type of weapon directing fire against the AAV-P7 vehicles.

1.8.1 Equipment Capabilities and Features.

- a. Easily installed and removed.
- b. Simulates firing capabilities of the M2 machine gun.
- c. Normal firing procedures used for all weapons.
- d. Detects all incoming fire, identifies incoming weapons and Player Identification (PID), and determines the effect of incoming fire on the using vehicle.
- e. Uses eye-safe laser transmitters.
- f. High visibility Kill Status Indicator (KSI) strobe light signals vehicle Near Miss, Hit, or Kill.
- g. Compatible with all other MILES devices.

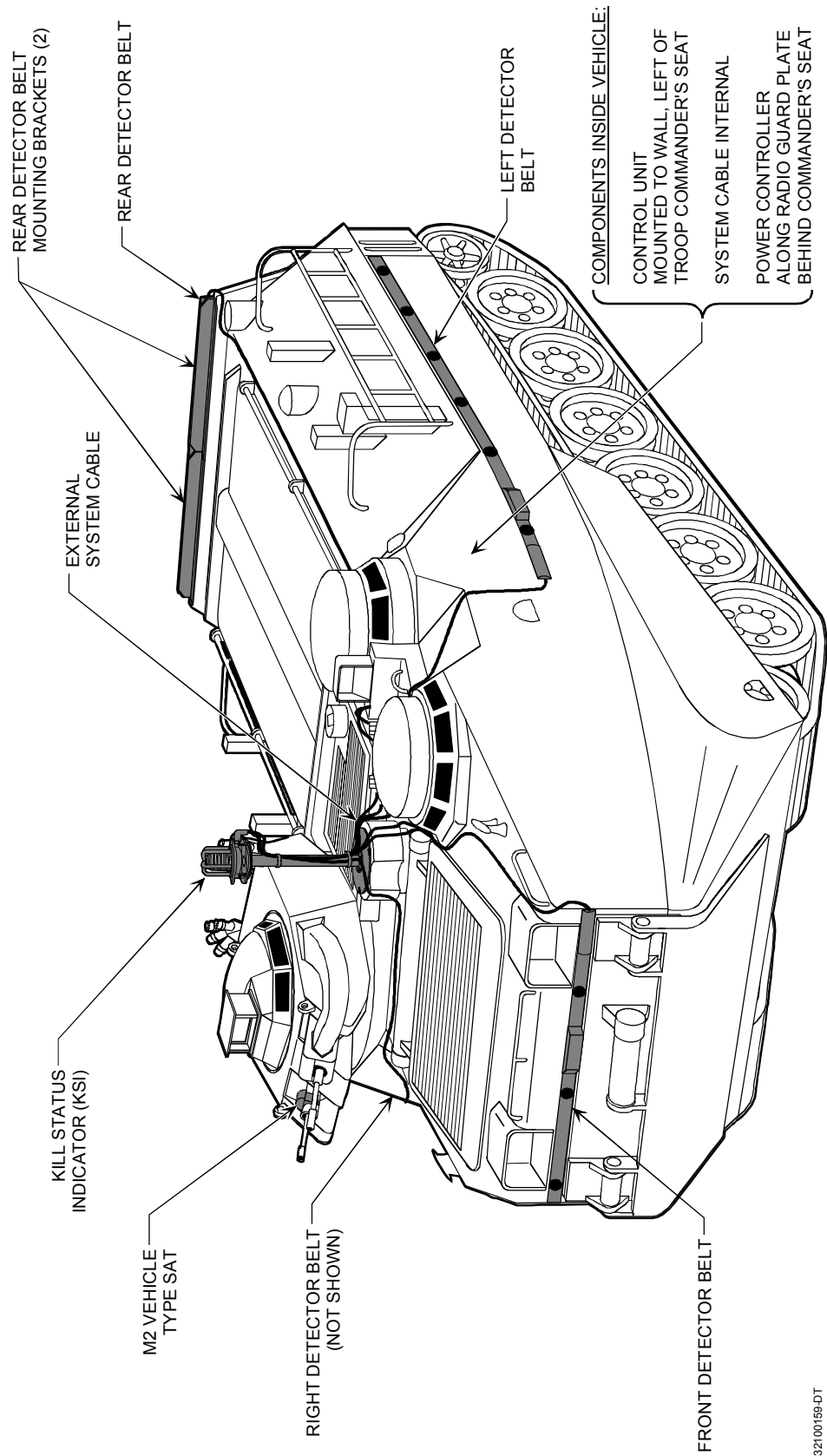
1.9 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

NOTE

MILES 2000 equipment installation procedures should be followed as outlined in the technical manual. If the following procedures CANNOT be followed due to cable length or additional vehicle equipment, then place the MILES equipment in the best and safest location.

The MILES 2000 AAV-P7 (Figure 1-1), contains the following equipment:

- a. Small Arms Transmitter (SAT). Adaptation for the specific weapon is through a factory set laser power adjustment, modifying the encoded personality Programmable Read-Only Memory (PROM), and attaching the weapon specific mounting adapter. The laser power is factory adjusted to represent the specific weapon type and simulate its firing capabilities. A window for the infrared link transmitter and receiver, and a sunlight readable firing indicator, are located in the rear cover. The SAT is powered by an internal 3.6-volt lithium battery with a 3-year battery life. The M2 SAT mounts to the trunion on the front of the turret.



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Figure 1-1. AAV-P7.

- b. Detector Belts. Four (4) detector belts provide detection coverage for each aspect of the vehicle's vulnerability zones. The belts for the AAV-P7 are mounted as follows: right, left, front, and rear of the vehicle.
- c. Kill Status Indicator (KSI). The KSI is an integrated status indicator which provides information to an attacking vehicle. The KSI is composed of two (2) major functional elements: a visual strobe and the decoder/interface electronics. The KSI also includes the interface inputs for the serial bus interface, and the optical input/output (I/O) port. The optical I/O port provides the optical interface to the Controller Device/Training Data Transfer Device (CD/TDTD) (Controller Gun) for transfer of vehicle types/probability of kill (Pk) data uploading and events downloading. The KSI also includes a motion sensor to detect vehicle motion after a Mobility Kill, to allow the Control Unit (CU) to assess a Cheat Kill if motion occurs after 20 seconds. The KSI is bolted to the ventilator aspirator on the AAV-P7.
- d. Control Unit (CU). The CU contains all the primary user interface functions, displays and controls. Vehicle status and event display are functions provided by the CU. The CU is mounted, using fastener tape, to the wall left of the troop commander's seat in the AAV-P7.
- e. Power Controller. The Power Controller provides 24 Vdc, the charging voltage for the internal lead acid batteries, as well as power to the MILES 2000 system. The 24-volt battery is converted to 10.5-Vdc output by a DC-DC converter for use by the MILES 2000 kit, and provides backup power for 100 hours. The battery also supplies power to the KSI for a 10-minute time period, in the event the vehicle's power is turned off and the vehicle is killed. The Power Controller is installed along the radio guard plate behind the troop commander's seat in the AAV-P7.

1.10 EQUIPMENT DATA.

Table 1-3 defines the Equipment Data.

Table 1-3. Equipment Data.

EQUIPMENT	WEIGHT (POUNDS)	DIMENSIONS L x W x D (INCHES)	MAX EFFECTIVE RANGE (METERS)
M2 Machine Gun SAT	0.4	3.1 x 1.9 x 1.7	1830
			NUMBER OF DETECTORS
Front or Rear Belts	2	65.98 x 2.0	3
Left or Right Belts	3	175.98 x 2.0	6
Kill Status Indicator (KSI)	5.5	8.46 x 8.15 x 2.49	
Control Unit (CU)	0.97	4.94 x 3.98 x 1.97	
Power Controller	7.9	5.42 x 6.11 x 3.0	

SECTION III. THEORY OF OPERATION

1.11 BASIC PRINCIPLES OF OPERATION.

1.11.1 Basic Principles of Operation (MILES 2000). The MILES 2000 system uses laser beams to simulate actual weapons fire. An eye-safe invisible laser beam is sent out by each weapon's transmitter when it is fired. The laser beam is coded and simulates all of the weapon's capabilities including range, accuracy, and destructive capability.

Laser detector systems are used to sense incoming fire. The detector systems register incoming laser beams and determine whether they have scored a Near Miss, Hit, or Kill. Incoming fire can result in more than one type of a Hit or Kill. Types of hits or kills include Mobility, Communications, Firepower, or a Catastrophic Kill of the entire vehicle.

Table 1-4 defines the Kill Indication Chart.

1.11.2 Principles of Operation (MILES for AAV System). All weapons on the AAV-P7 that are equipped with laser transmitters are fired using normal weapon operating procedures. Each AAV-P7 has detector belts attached that sense incoming fire. A CU mounted inside, displays the extent of incoming fire and its effect. The KSI is activated by the CU when incoming fire is detected.

1.11.2.1 M2 Machine Gun Small Arms Transmitter (SAT). The M2 machine gun is fired using normal procedures. The gun is fitted with a Blank Fire Adapter (BFA) and loaded with blank ammunition. The sound/flash of blank fire is sensed by the M2 SAT mounted to the trunion on the front of the turret. The laser transmitter will operate as long as blank ammo is being fired. (The M2 SAT must be enabled by the gunner's Individual Weapons System [IWS].)

1.11.2.2 Detector Belt System. Four (4) detector belts are mounted on the AAV-P7 which sense incoming fire. Each belt is electrically equal to a zone for a total of four (4) zones, which represent the sides of the vehicle. They generate electrical signals that are fed to a decoder in the KSI.

1.11.2.3 Kill Status Indicator (KSI). Receives MILES messages from the detector belts, decodes them, and then routes all valid messages to the CU. It has an optical port for external interface with the CD/TDTD (Controller Gun), and a motion sensor. It is mounted to provide 360E visibility of the flashing light. Refer to Table 1-4 Kill Indication Chart for a list of the types of kills and the KSI indications.

1.11.2.4 Control Unit (CU). The CU provides the following: casualty assessment using Pk tables, records/stores event data (500 events max), provides system real-time clock, monitors system for hardware failures and for cheat attempts, commands KSI to flash, and interrupts vehicle external communications during Communications/Catastrophic kills.

Table 1-4. Kill Indication Chart.

TYPE OF HIT/KILL	NUMBER OF KSI FLASHES	AUDIBLE INDICATION
Vehicle		
Shoulder-Mounted Assault Weapon (SMAW) Spotting Rifle	1 Flash	None
Near Miss	2 Flashes	Near Miss.
Hit	4 Flashes	Hit.
Mobility Kill	4 Flashes	Hit, Mobility. Stop Vehicle. (The crew has 20 secs to bring the vehicle to a stop.)
Fire Power Kill	4 Flashes	Hit, Fire Power.
Communications Kill	4 Flashes	Hit, Commo Kill. (disables external communications only)
Catastrophic Kill	Flashes Continuously	Vehicle Kill
Administrative Kill	Flashes Continuously	Vehicle Kill
Cheat Kill	Flashes Continuously	Cheat Kill
Reset/Resurrect	1 Flash	Reset/Resurrect
IWS		
Near Miss	N/A	2 Beeps
Kill	N/A	Continuous
Administrative Kill	N/A	Continuous
Cheat Kill	N/A	Continuous
Reset/Resurrect	N/A	4 Beeps
<p>Notes: Cheat Kill will occur during a Mobility Kill if the vehicle does not stop within the allotted 20 seconds or moves after it has stopped. A Cheat Kill will occur when disconnecting any of the following pieces of vehicle equipment: KSI, any Detector Belt/Array, or Power Controller (must be reconnected for cheat to be indicated), or removing the battery on IWS Console (DPCU).</p> <p>The IWS is issued as part of a separate equipment kit.</p> <p>EMERGENCY COMM OVERRIDE PROCEDURE: Refer to paragraph 2.6.4.</p> <p>In the event of a Catastrophic or Communications Kill, external communications can be over-ridden for EMERGENCIES ONLY by pressing the USER INFO push button on the Control Unit, selecting communication override and pressing the ENTER push button.</p>		

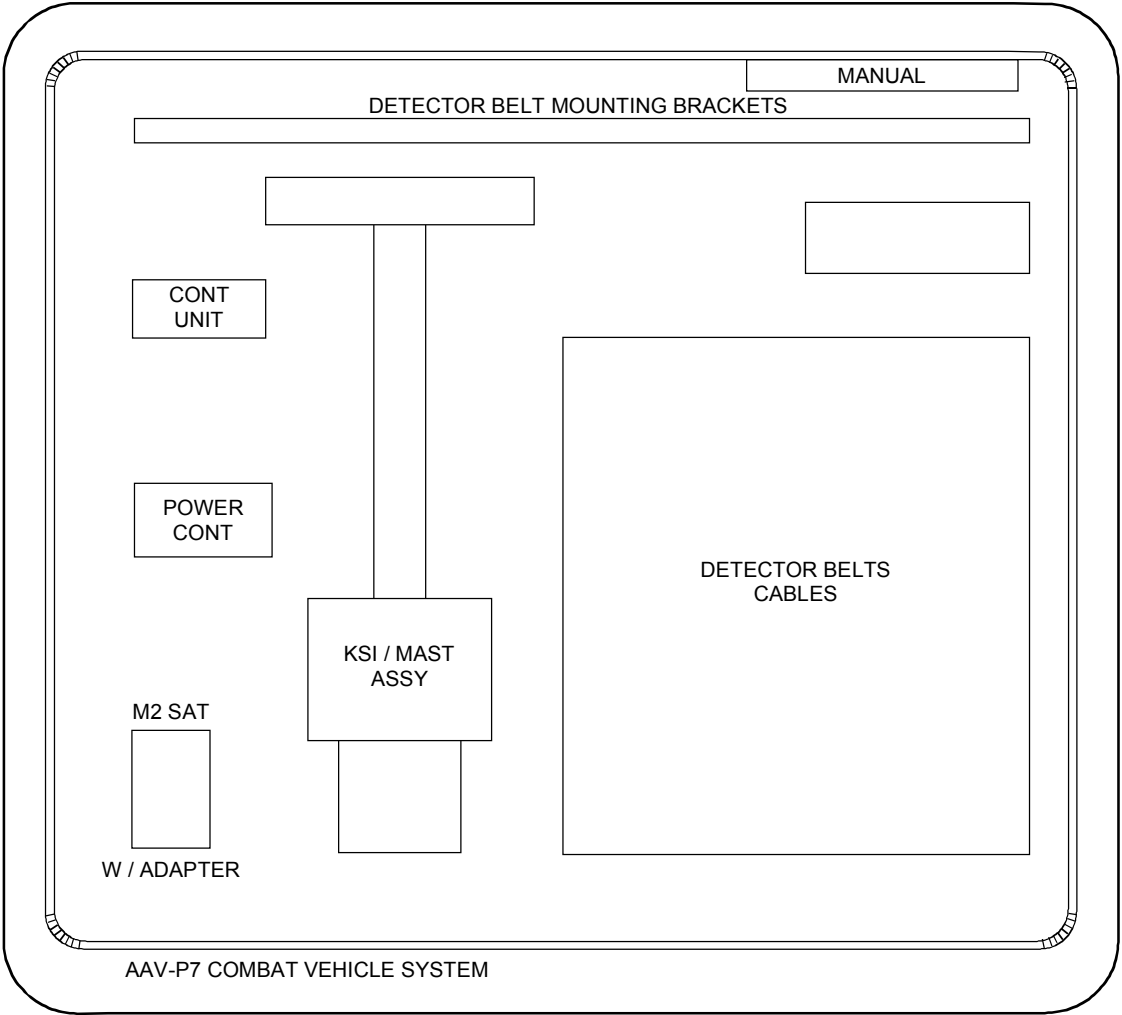
1.11.2.5 Power Controller. The Power Controller contains a rechargeable battery pack and operates from the vehicle power to maintain the battery charge. It automatically switches to the internal battery to provide power when the vehicle power drops lower than the internal battery power, or when the vehicle power is removed from the MILES 2000 system.

Table 1-5 defines the Kit/Equipment List.

Table 1-5. Kit/Equipment List.

PACKAGE NOMENCLATURE: SIMULATION SYSTEM, AAV-P7 VEHICLE				
PACKAGE PERTAINS TO: 146900-2				
PACKAGE CONTENTS				
QTY	NAME OF ITEM	DWG NO.	PART NO.	NOTES
1	CONTROL UNIT ASSEMBLY	146402	146402-2	
1	MAST ASSY, KSI-AAV-P7/C7	146903	146903-2	
1	POWER CONTROLLER ASSY	146409	146409-2	
1	CABLE ASSY, INTERNAL-AAV-P7	146904	146904-1	
1	CABLE ASSY, EXTERNAL-AAV-P7	146906	146906-1	
2	DETECTOR BELT ASSY, FRONT OR REAR, AAV-P7, C7	146910	146910-1	
2	DETECTOR BELT ASSY, LEFT OR RIGHT, AAV-P7, C7	146912	146912-1	
2	BRACKET, DETECTOR BELT MOUNTING, AAV-P7, C7	146914	146914-1	
1	TRANSIT CASE, AAV-P7	146902	146902-1	4
1	SAT/ADAPTER ASSY, M2, AAV-P7	147705	147705-2	
AR	OPERATOR'S MANUAL		TD 9-6920-891-10	
6	STRAP, BLK, 3/4" X 6"			1
6	STRAP, BLK, 3/4" X 8"			2
2	STRAP, BLK, 3/4" X 12"			3
102	ANTISEIZE LUBRICANT, 1 OZ TUBE		MIL-A-907	5
NOTES:				
1. MAY BE PURCHASED IN BULK QUANTITY AS PART OF VELCRO USA, CAGE CODE 11153, PART NO. 170790. THIS REEL CONSISTS OF 1200 STRAPS.				
2. MAY BE PURCHASED IN BULK QUANTITY AS PART OF VELCRO USA, CAGE CODE 11153, PART NO. 170091. THIS REEL CONSISTS OF 900 STRAPS.				
3. MAY BE PURCHASED IN BULK QUANTITY AS PART OF VELCRO USA, CAGE CODE 11153, PART NO. 170782. THIS REEL CONSISTS OF 600 STRAPS.				
4. MARK THE TRANSIT CASE (2 PLACES) WITH THE APPLICABLE DASH NUMBER AFTER THE BASIC PART NUMBER. THE MARKING SHALL BE 6.35mm HIGH CHARACTERS MINIMUM, COLOR WHITE NO. 27925 IN ACCORDANCE WITH FED-STD-595. LOCATE AS SHOWN ON TRANSIT CASE DRAWING.				
5. ALTERNATIVES: ANTISEIZE LUBRICANT, PART NO. 51001, CAGE CODE 05972, IN 1 OZ TUBE OR PART NO. 767, CAGE CODE 05972, OR PART NO. C5A, CAGE CODE 05972.				

See Figures 1-2 and 1-3 following this table.



32000030-DT
PN 146902

Figure 1-2. AAV-P7 Transit Case.

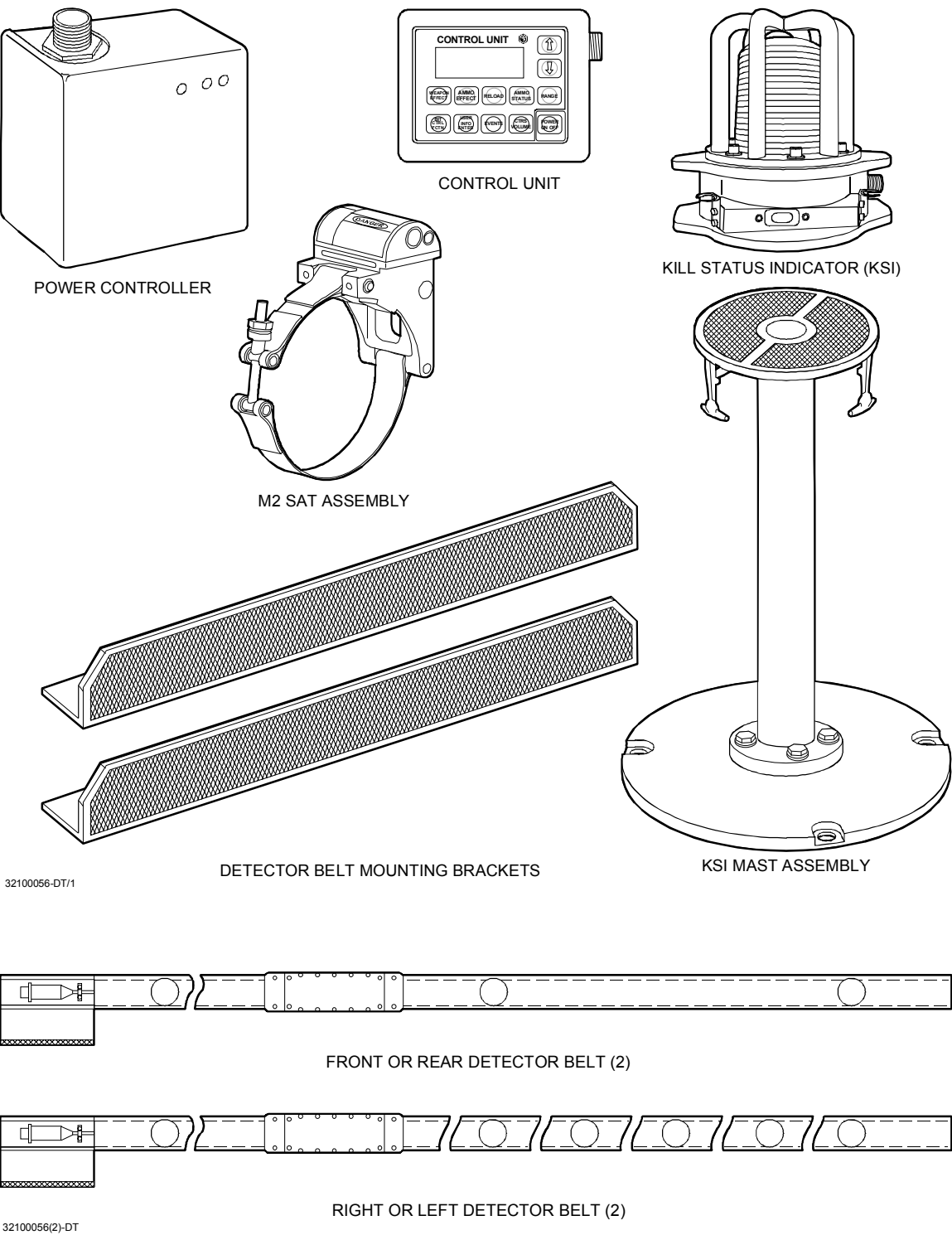


Figure 1-3. AAV-P7 System Components (Items not to Scale) (Sheet 1 of 2).

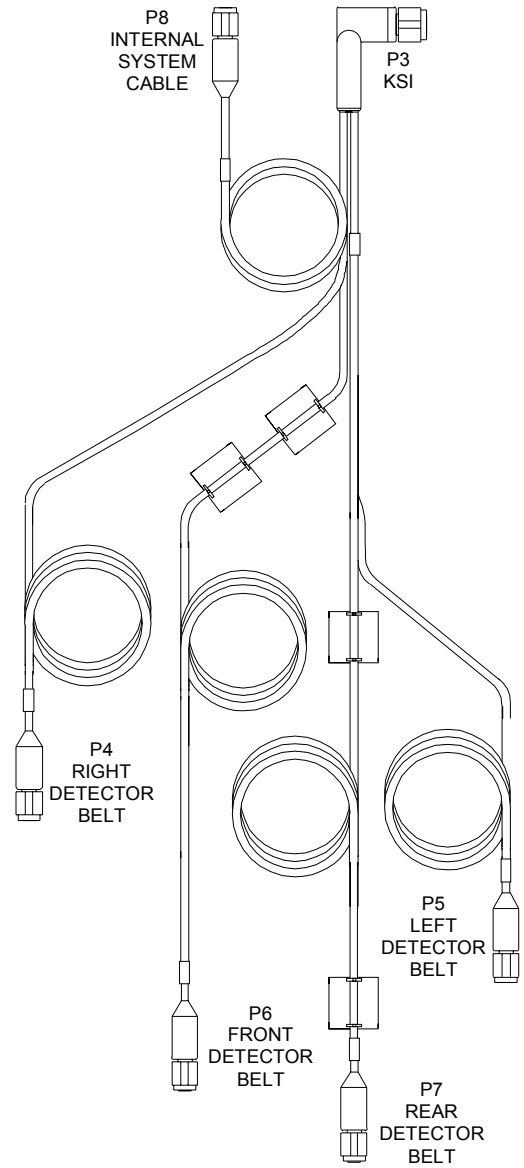
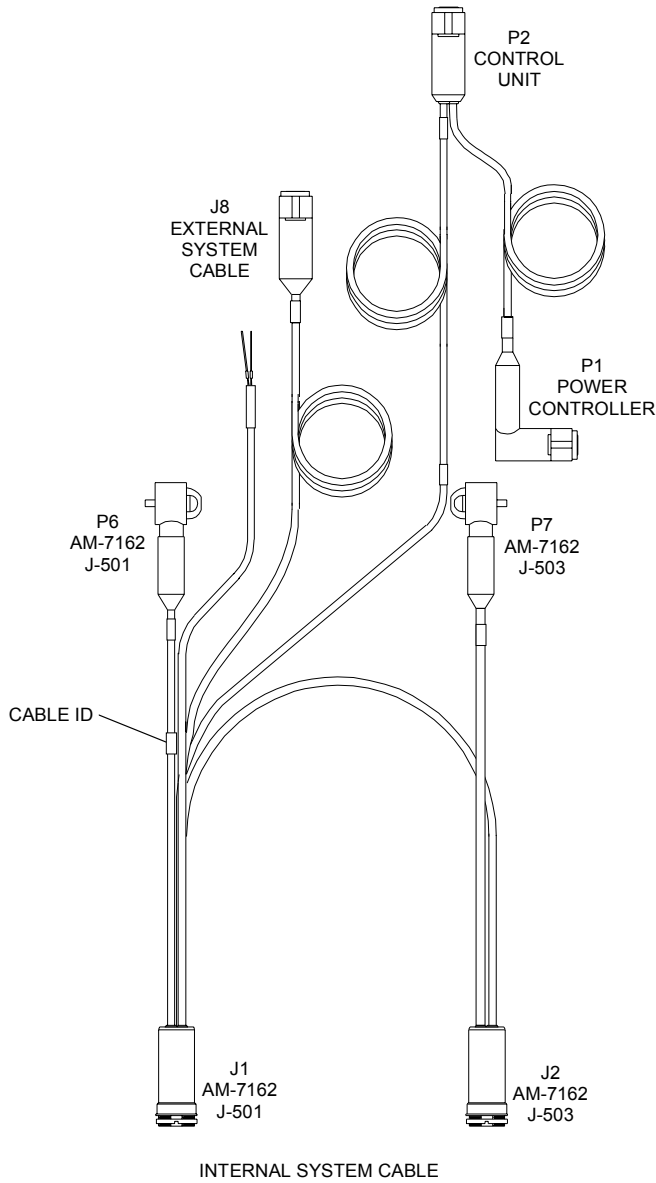


Figure 1-3. AAV-P7 System Components (Items not to Scale) (Sheet 2 of 2).

CHAPTER 2 OPERATING INSTRUCTIONS

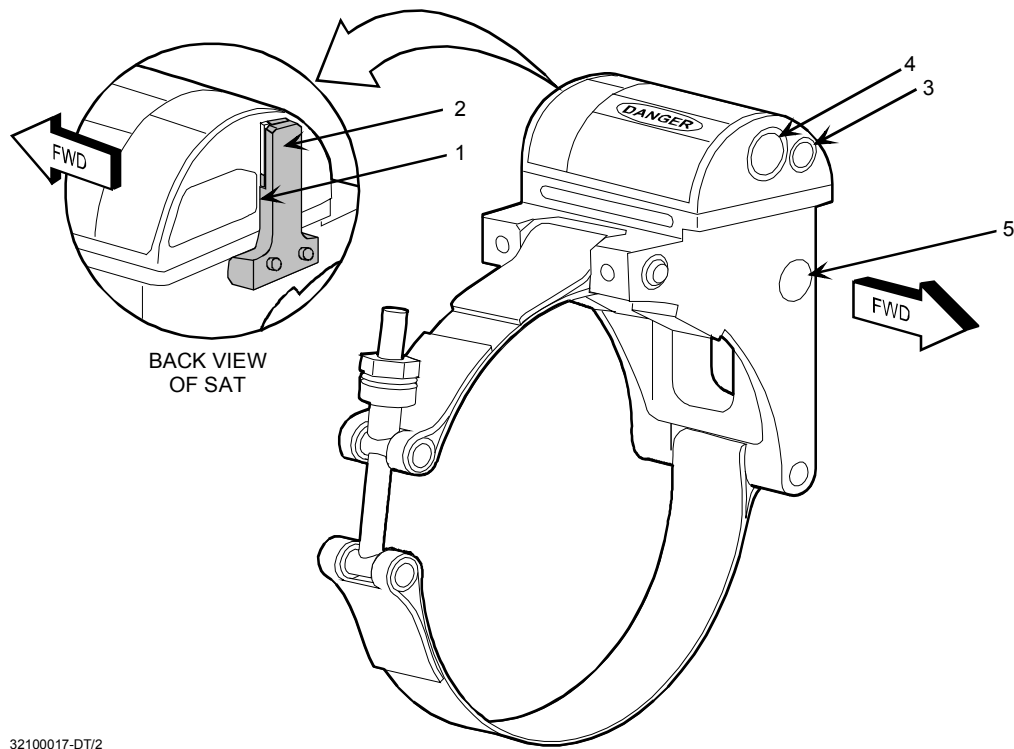
SECTION I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2.1 EQUIPMENT CONTROLS AND INDICATORS.

The following figures shown in Table 2-1 illustrate and describe the MILES 2000 AAV-P7 operating controls and indicators.

Table 2-1. Controls and Indicators Reference.

ITEM	FIGURE NO.
Small Arms Transmitter (SAT)	2-1
Detector Belts	2-2
Kill Status Indicator (KSI)	2-3
Control Unit (CU)	2-4
Power Controller	2-5



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Figure 2-1. Small Arms Transmitter (SAT).

1. FIRING INDICATOR AND IR TRANSMITTER/RECEIVER PORT. Firing indicator illuminates when the SAT fired as a visual aid to the soldier/marine. Infrared (IR) port provides a link between the weapon and the IWS torso harness.
2. ALIGNMENT SHAFTS PROTECTIVE POST. Used to cover the factory set alignment shafts.
3. BLANK SENSOR WINDOW. Allows light flash from blank firing of the weapon to be sensed so the SAT laser will be transmitted.
4. LASER OPTICAL WINDOW. Window through which the SAT laser beam is transmitted.
5. BORESIGHT BUSHING. Allows insertion of Boresighting Telescope.

NOTE

This SAT has a factory set laser alignment and is not to be used with the Automatic Small Arms Alignment Fixture (ASAAF).

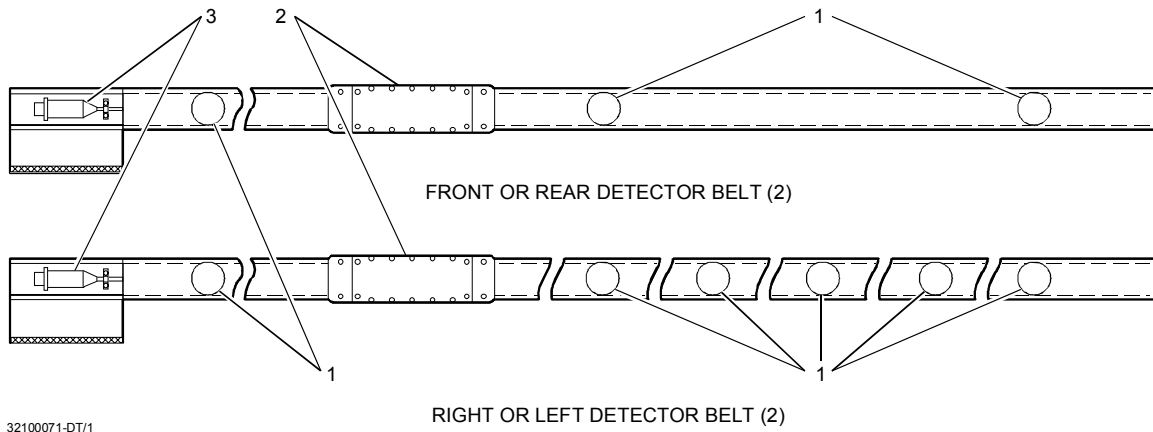
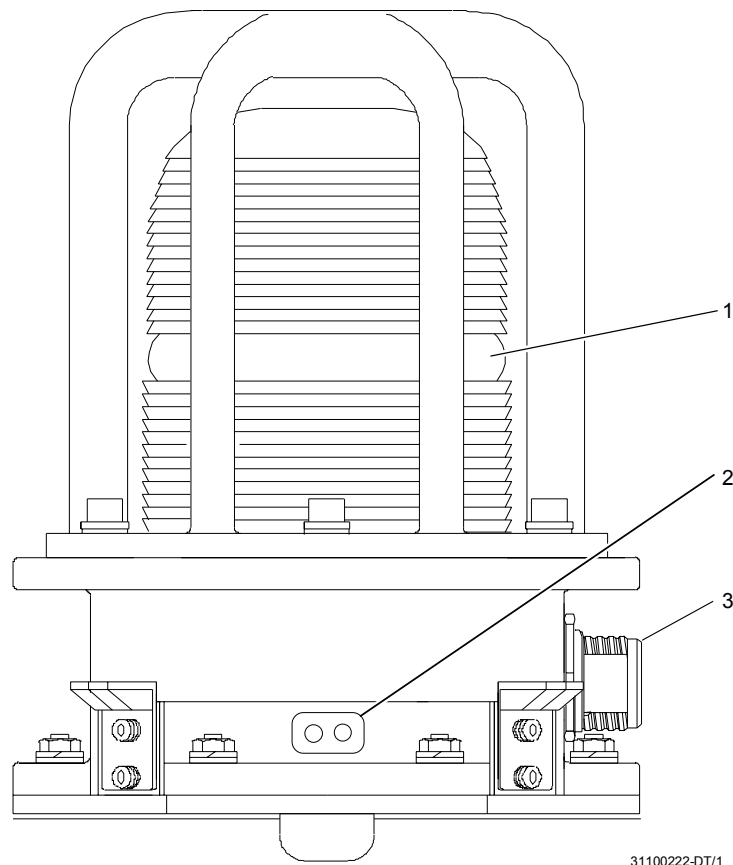


Figure 2-2. Detector Belts.

NOTE

There are four (4) detector belts used on the AAV system.

1. DETECTORS. Detect laser transmissions that are being fired at the vehicle.
2. AMPLIFIER. Amplifies coded laser signals that simulate incoming fire and forwards them to the KSI.
3. CONNECTOR. System Cable connection.



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Figure 2-3. Kill Status Indicator (KSI).

1. **VISUAL STROBE.** Provides a 360E azimuth and 60E elevation optical output when a vehicle is hit (housed in an amber dome).
2. **OPTICAL PORT.** Bidirectional IR communication link used by Controller Device/Training Data Transfer Device (CD/TDTD) (Controller Gun) for uploading and downloading data.
3. **CONNECTOR.** System Cable connection.

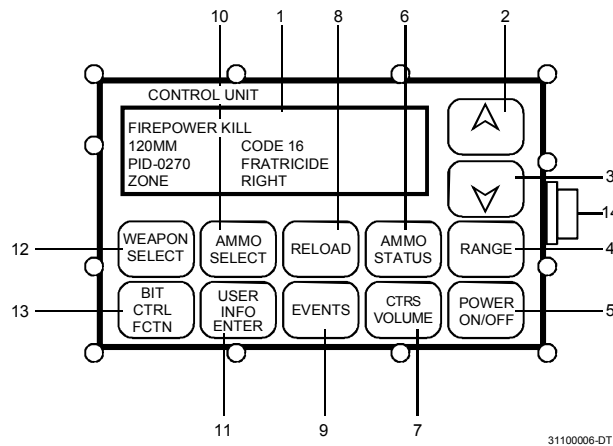
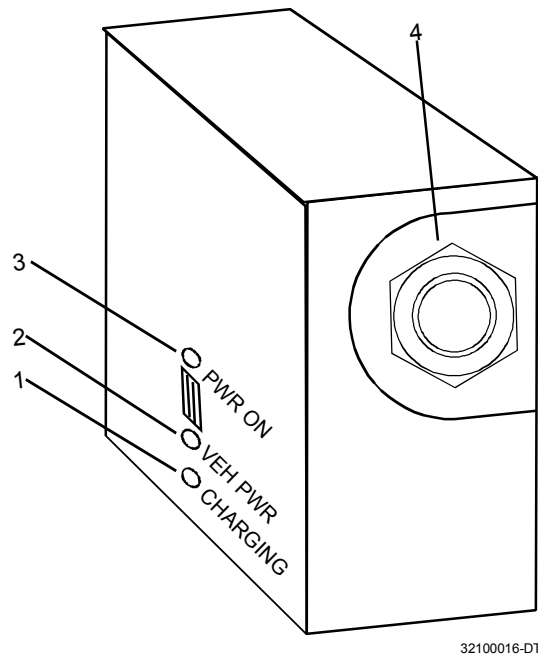


Figure 2-4. Control Unit (CU).

1. DISPLAY WINDOW. Displays events and system messages. (Example display shown.)
2. SCROLL UP PUSH BUTTON. Scrolls display up when pressed, and also moves the cursor.
3. SCROLL DOWN PUSH BUTTON. Scrolls display down when pressed, and also moves the cursor.
4. RANGE PUSH BUTTON. Allows the operator the option to input his estimate of target range. (Not available.)
5. POWER ON/OFF. Enables/disables the MILES 2000 System.
6. AMMO STATUS PUSH BUTTON. Displays number of rounds remaining for selected weapon. (Not available.)
7. CTRS/VOLUME. CTRS allows user to adjust illumination of display. VOLUME allows user to adjust audio level to the vehicle headset.
8. RELOAD PUSH BUTTON. Causes the system to load into the MILES 2000 system, any available selected ammunition shown in the display window. (Not available.)
9. EVENTS PUSH BUTTON. Allows the operator to review the 16 most recent events on the display window.
10. AMMO SELECT PUSH BUTTON. Allows the operator to view the different ammunition quantities and types available for a selected weapon. (Not available.)
11. USER INFO/ENTER PUSH BUTTON. USER INFO allows operator the ability to check his PID and vehicle type, **override the communications disable function under Communications/Catastrophic Kill conditions in an emergency**. ENTER allows controller to enter commands selected in Control Function mode.
12. WEAPON SELECT PUSH BUTTON. Allows the operator the option to select the desired weapon to be used. (Not available.)
13. BIT/CTRL FCTN PUSH BUTTON. Built-in-Test (BIT) executes a system BIT with the results shown in the display window. CTRL FCTN allows controller to select vehicle platform type, blank or dryfire coax activation, and Flash Weapons Effects Signature Simulator (FlashWESS) or Anti-Tank Weapons Effects Signature Simulator (ATWESS) activation, etc.
14. CONNECTOR. System Cable connection.



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146409-2

Figure 2-5. Power Controller.

1. CHARGING INDICATOR (146409-2). Illuminates when battery voltage drops below 27.5 Vdc, and battery is charging.
2. VEHICLE POWER PRESENT INDICATOR. Light Emitting Diode (LED) blinks continuously when vehicle power is at the CVS system, and the internal batteries are being trickle charged.
3. 10.5 VDC POWER PRESENT INDICATOR. LED blinks continuously when 10.5 Vdc power is ON.
4. CONNECTOR. System Cable connection.

SECTION II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Preventive Maintenance Checks and Services (PMCSs) will ensure that the MILES 2000 equipment will be ready for operation, and perform satisfactorily throughout its mission. Preventive maintenance checks consist of performing a systematic inspection to discover defects before they result in operational failure of the equipment. Defects or malfunctions discovered by the crew during use of the MILES 2000 equipment, or as a result of performing maintenance checks and services, will be turned into issuing authority, and replacement equipment checked out.

2.2 INTRODUCTION TO PMCS TABLE.

Operator PMCSs are shown in Table 2-2. Tasks to be performed before operation appear in the “B” column under the heading “Interval.” Tasks to be performed during operation are checked in the “D” column. Tasks to be performed after operation are checked in the “A” column. Tasks to be performed weekly are checked in the “W” column, with tasks to be performed monthly checked in the “M” column.

NOTE

Cleaning of MILES 2000 equipment requires no special procedures or the use of cleaning compounds/chemicals. Clean all areas, including the lens area by: (1) wiping dirt and dust away using a soft rag; (2) clean with a soft cloth rag dampened with water; and (3) polish to a brilliant luster with a finishing cloth. **The use of chemicals to clean MILES equipment, including the cleaning of lenses, is not recommended.**

NOTE

Within designated interval, these checks are to be performed in the order listed.

B - Before Operation

W - Weekly

D - During Operation

M - Monthly

A - After Operation

Table 2-2. Operator Preventive Maintenance Checks and Services.

ITEM NO.	ITEM TO BE INSPECTED	INTERVAL					PROCEDURES CHECK FOR AND HAVE REPAIRED	EQUIPMENT IS NOT READY/AVAILABLE IF:
		B	D	A	W	M		
1.	Small Arms Transmitter (SAT)	✓		✓		✓	Inspect for dirty or damaged windows. Clean windows.	Windows broken, cracked, or missing.
2.	Control Unit (CU)	✓		✓		✓	Inspect for cracks in display window and membrane switches.	Display window or membrane switch broken.
		✓					Check for display in display window when powered on.	No display in display window when powered on.
3.	Kill Status Indicator (KSI)	✓		✓		✓	Inspect for cracks in plastic lens (amber dome).	Lens (amber dome) cracked.
		✓		✓		✓	Check for optical port damage.	Lens broken, cracked or missing.
4.	Power Controller	✓		✓		✓	Inspect for damaged connector.	Broken connectors. Bent or missing pins.
		✓		✓		✓	Inspect for acid leaks.	Acid is present.
5.	Detector Belts	✓		✓		✓	Wipe all detector/connectors clean. Inspect harnesses for damage that would prevent normal operation.	Detectors broken or missing. Connector pins dirty, bent, or missing. Amplifier broken.
6.	Cables	✓		✓		✓	Inspect for damaged connector. Inspect connector pins for dirt, bent or missing.	Connector damaged. Connector pins dirty, bent or missing.

NOTE

Cleaning of MILES 2000 equipment requires no special procedures or the use of cleaning compounds/chemicals. Clean all areas, including the lens area by: (1)

wiping dirt and dust away using a soft rag; (2) clean with a soft cloth rag dampened with water; and (3) polish to a brilliant luster with a finishing cloth.

The use of chemicals to clean MILES equipment, including the cleaning of lenses, is not recommended.

SECTION III. OPERATION UNDER USUAL CONDITIONS

2.3 ASSEMBLY AND PREPARATION FOR USE.

MILES 2000 equipment must be inspected and prepared as described in the following paragraphs prior to use.

NOTE

The quadrants of the vehicle--left, right, front, rear--are determined from the driver's viewpoint, which would be as facing towards the front of the vehicle. All installation instructions are given from this viewpoint, even though at times the installer may be facing to the rear of the vehicle.

2.3.1 Installation of MILES 2000 Equipment on AAV-P7. (See Figure 2-6.)

NOTE

When applying fastener tape, always apply the "hook" type tape to the holding surface (the surface to which an item will be installed), and the "pile" type tape to the item being installed. For example, when installing the CU in the AAV-P7, you would apply the hook tape to the left side wall of the troop commander's station, and the loop tape to the CU. The CU pile tape can then be attached to the side wall hook tape, firmly securing the CU.

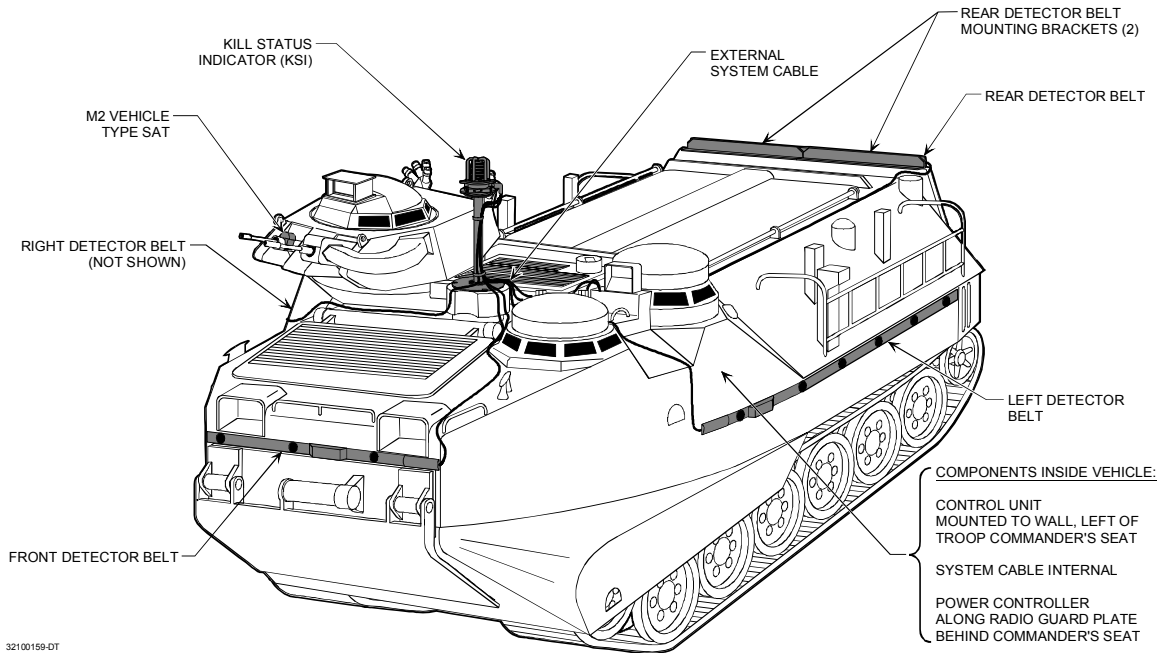


Figure 2-6. AAV-P7.

2.3.1.1 M2 Small Arms Transmitter (SAT).

NOTE

Prior to installing the M2 SAT, ensure that the MK19 weapon system is installed ensuring optimum performance of the MILES 2000 system.

- a. Remove the SAT from the transit case. Make sure the SAT is clean and dry, and not cracked or broken.
- b. Inspect the Blank Sensor Window and the Laser Optical Window, making sure that they are not cracked, broken, or missing. Make sure the mounting bracket is operational.
- c. Inspect the IR Transmit/Receive Window making sure that it is not cracked, broken, or missing.
- d. Replace and report damaged equipment, as required.
- e. Attach the SAT to the trunion of the 50 caliber machine gun mount on the front of the turret.

NOTE

Ensure adequate clearance when machine gun is pressed and elevated.

- f. Torque to 60 inch-pounds using 7/16" deep socket. (See Figure 2-7.)

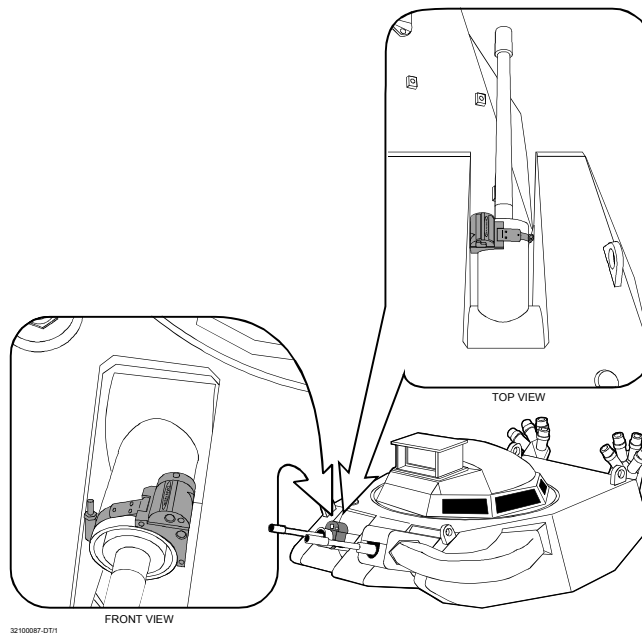


Figure 2-7. M2 SAT Installation.

NOTE

This SAT has a factory set laser alignment and is not to be used with the ASAAF.

Boresight the SAT with the vehicle weapons sight and per normal operations.

2.3.1.2 **Detector Belt Fastener Tape.** (See Figure 2-8.)

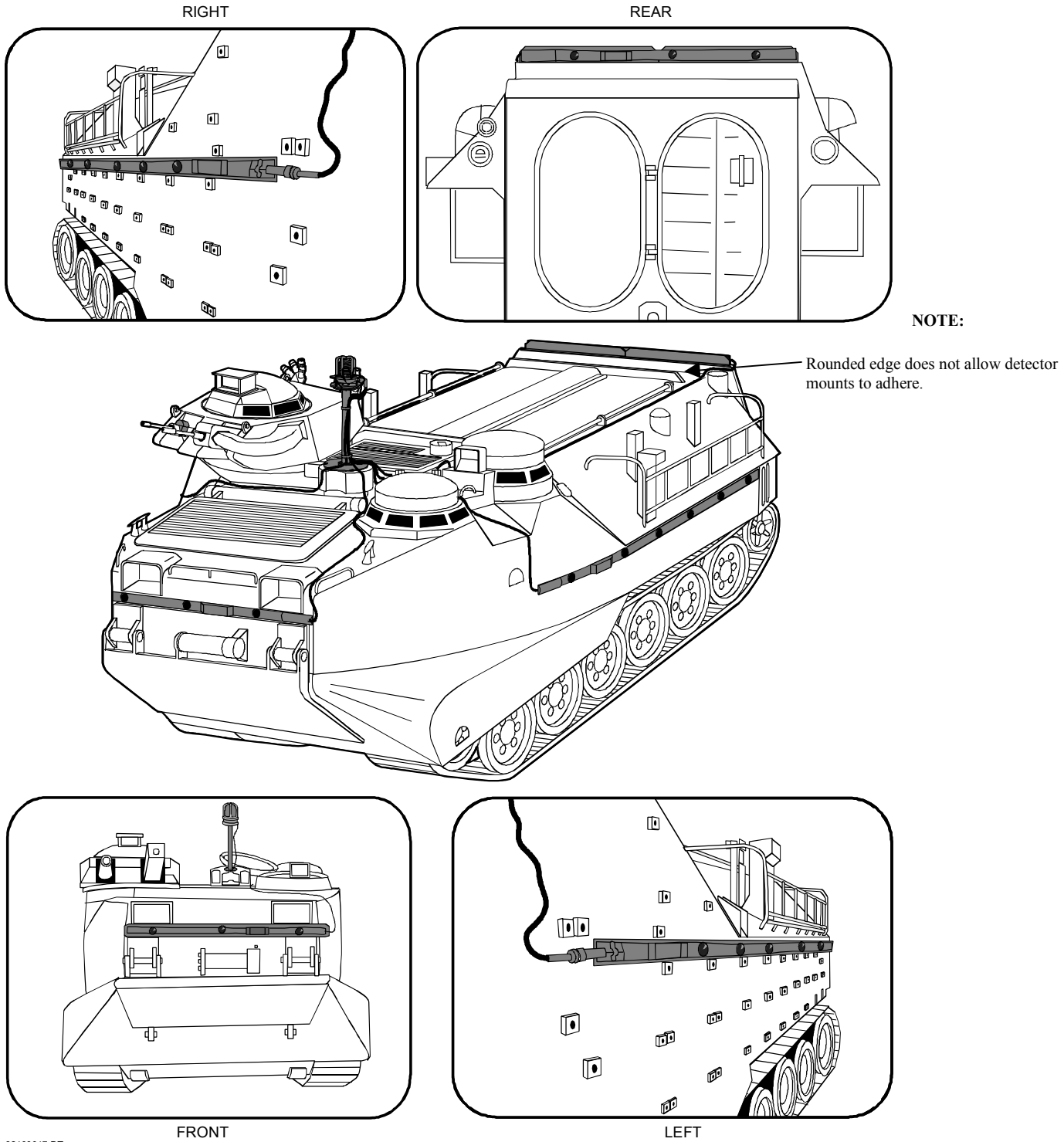


Figure 2-8. Detector Belts.

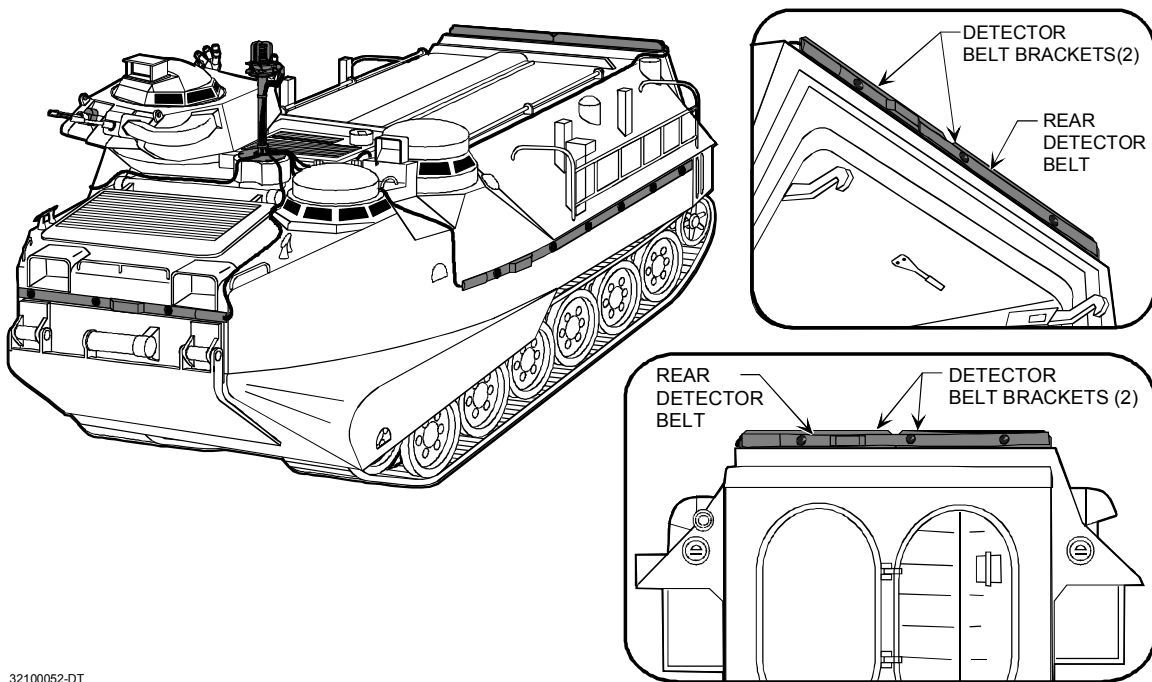
2.3.1.2.1 Applying Fastener Tape.

- a. Mark the vehicle for primer/fastener tape application along the areas where the belts will be routed. Those areas are described in the following paragraphs.
- b. A belt labeled Right or Left Detector Belt will attach along the right side of the vehicle where the slant and side meet. The amplifier should be under the vehicle commander's hatch, with the connector for the External System Cable routed towards the front of the vehicle.
- c. A belt labeled Right or Left Detector Belt will attach along the left side of the vehicle where the slant and side meet. The amplifier should be centered under the Bilge Pump Exhaust, with the connector for the External System Cable routed towards the front of the vehicle.
- d. The belt labeled Front or Rear Detector Belt will attach to the front swim line just below the headlights with the connector for the External System Cable placed at the left front corner below the headlight.

NOTE

To prevent damage to hook and pile tape, do not use tools to separate brackets. Hand separate brackets. To store brackets in transit case, place hook and pile tape pile to pile.

- e. The detector belt mounting brackets should have fastener tape applied to the bottom; if not, apply fastener tape. The brackets will be mounted to the top rear of the vehicle above the rear ramp. The belt labeled Front or Rear Detector Belt will attach to the center of the detector belt mounting bracket, with the External System Cable connector placed at the left corner of the mounting bracket. (See Figure 2-9.)



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Figure 2-9. Mounting Brackets Placement.

- f. Cut fastener tape to the appropriate lengths as indicated in steps a. thru e. above.

2.3.1.2.2 Fastener Tape Preparation. Much of the MILES 2000 equipment is mounted with fastener tape. If fastener tape is not affixed to the vehicle already, or if existing tape is worn and unserviceable, remove any existing tape and use the following directions to apply/reapply the fastener tape:

- a. Clean all areas where fastener tape is to be installed with water, a brush (if necessary), and rags. Tape will not adhere to a dirty, wet, or oily surface.

WARNING

Tape primer is toxic and highly flammable. Do not spray near heat, open flame, or sparks. Use primer only in well ventilated areas. Do not permit smoking in the area. Injury to personnel may result.

- b. Spray a heavy coat of tape primer on the cleaned areas along the strip where the fastener tape will be applied. Allow primer to dry thoroughly (follow the directions on the primer can) before applying the fastener tape. (See Figure 2-10.)

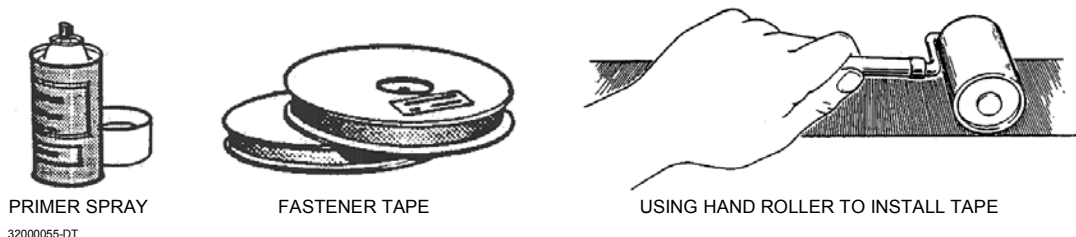


Figure 2-10. Fastener Tape Preparation.

NOTE

The fastener tape has a protective backing. When applying short lengths of tape, remove all the backing before installing the tape. When applying longer lengths, remove the backing gradually as you apply the tape. This will help keep the tape adhesive from sticking to itself or to the wrong surface.

The quadrants of the vehicle-left, right, front and rear are determined from the driver's viewpoint, which would be as facing towards the front of the vehicle. All installation instructions are given from this viewpoint, even though at times the installer may be facing to the rear of the vehicle.

NOTE

MILES equipment installation procedures should be followed as outlined in the technical manual. If the following procedures CANNOT be followed due to cable length or additional vehicle equipment, then place the MILES equipment in the best and safest location.

NOTE

Primer spray, fastener tape, and roller not part of kit.

2.3.1.2.3 Fastener Tape (Right Belt).

- a. Begin by applying fastener tape at the right front side where the slant and side meet. (See Figure 2-8.) Apply fastener tape to match the outline.
- b. Continue applying fastener tape along the right side, ending at the right rear.

2.3.1.2.4 Fastener Tape (Left Belt).

- a. Begin by applying fastener tape at the left front side where the slant and side meet. (See Figure 2-8.) Apply fastener tape to match the outline.
- b. Continue applying fastener tape along the left side, ending at the left rear.

2.3.1.2.5 Fastener Tape (Front Belt).

- a. Begin by applying fastener tape at the front swim line just below the headlights. (See Figure 2-8.) Apply fastener tape to match the outline.
- b. Continue applying fastener tape along the front, ending at the left front corner below the headlight.

2.3.1.2.6 Fastener Tape (Rear Belt).

- a. Begin by checking the detector belt mounting brackets for installed fastener tape.
- b. If none is present, apply fastener tape across the mounting brackets.
- c. Apply fastener tape across the top rear of the vehicle (not on rounded surface) above the rear ramp.

NOTE

To prevent damage to hook and pile tape, do not use tools to separate brackets. Hand separate brackets. To store brackets in transit case, place hook and pile tape pile to pile.

CAUTION

Amplifier can be damaged if it comes loose and is hanging down when rear ramp is closed.

- d. Install detector belt mounting brackets to the fastener tape on the top rear of the vehicle.

2.3.1.3 Detector Belts.

- a. Inspect detector belts for damage.
- b. Wipe all the detectors clean.
- c. Inspect connectors for dirt and/or damage.
- d. Replace and report damaged equipment, as required.

CAUTION

Do not spill fuel on detector belts or fastener tape. Fuel dissolves the adhesive properties of the tape primer and may cause a detector belt to fall from the vehicle, causing damage or loss of a detector belt.

- e. Working with short sections, press the Front Detector Belt to the fastener tape. Ensure the connector for the External System Cable is at the Left/Front corner of the vehicle below the highlight.
- f. Working with short sections, press the Right Detector Belt to the fastener tape on the vehicle. Ensure the connector for the External System Cable is placed at the Front of the vehicle. Make sure the belt is securely installed with no buckles or creases. Follow these procedures for the Left Detector Belt.

NOTE

Detector mounts will not adhere to rounded edge or surfaces.

- g. Working with short sections, press the Rear Detector Belt centered on the detector belt mounting brackets, so that the External System Connector will be located at the left rear corner of the vehicle. Make sure the belt is securely installed with no buckles or creases. Ensure the mounting brackets are seated securely.

2.3.1.4 Kill Status Indicator (KSI).

- a. Remove the KSI and the attached mast assembly from the transit case, and inspect the KSI for damage.
- b. Inspect connector for dirt and/or damage.
- c. Replace and report damaged equipment, as required.
- d. Remove the four (4) 3/4" bolts from the ventilator aspirator on top of the vehicle, and keep them with you. (See Figure 2-11.)

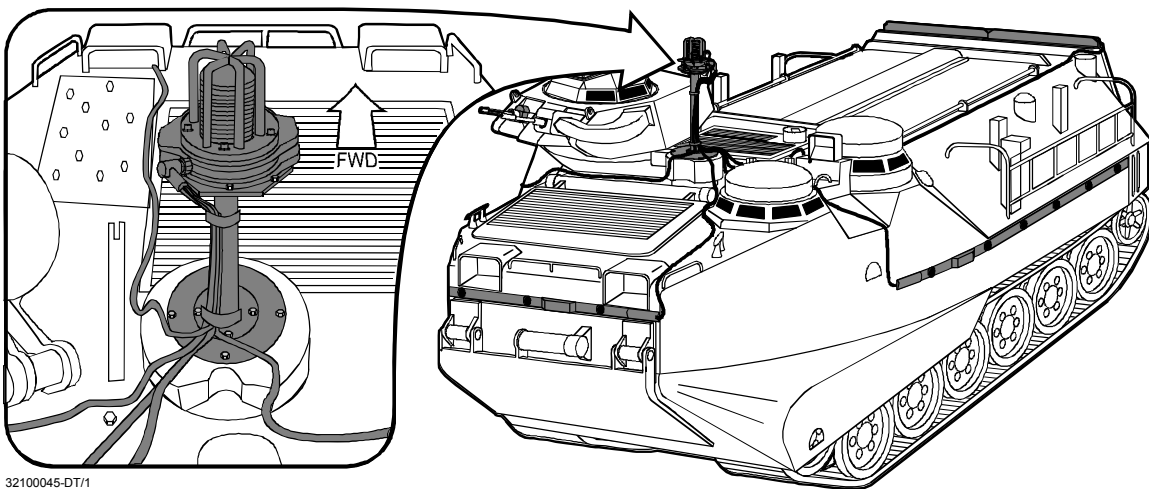


Figure 2-11. KSI Installation.

- e. Position the KSI and mast assembly with the connector pointing towards the troop commander's hatch.

- f. Line up the mounting holes on the adapter with the bolt holes on the ventilator aspirator.
- g. Using the four (4) previously removed bolts, secure the KSI and mast assembly to the ventilator aspirator. Ensure that the KSI and mast assembly are securely mounted.

2.3.1.5 External System Cable. (See Figure 2-12.)

WARNING

To prevent personal injury, turn all system power to the equipment off, including the CU, before conducting any removal/replacement procedures.

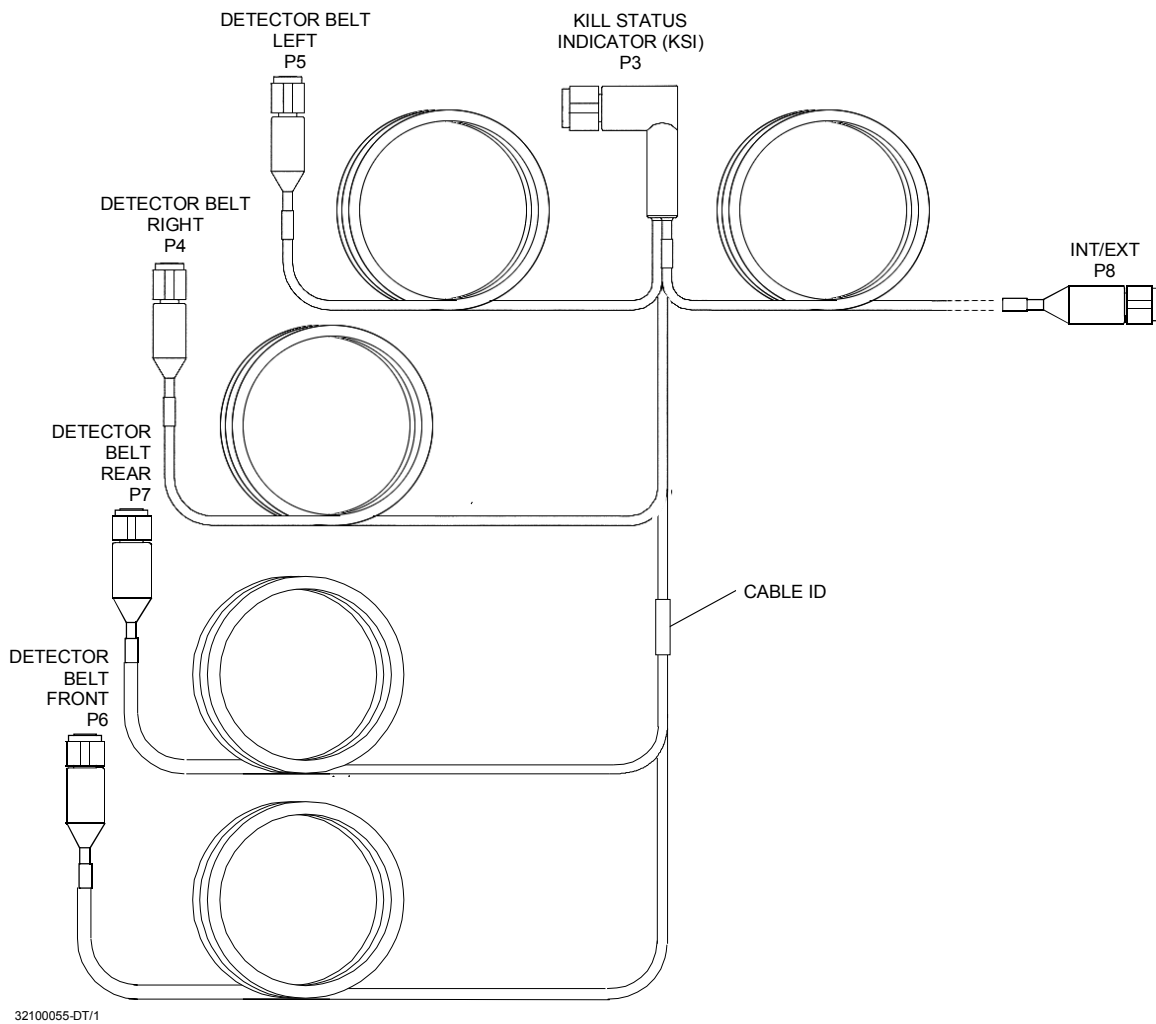


Figure 2-12. External System Cable.

NOTE

Route the cables and connect them to the individual units, using fastener tape tie-wraps at intervals. Secure the cables safely out of the way.

Letter/number designators are shown in parenthesis. For example: (P3) or (J1). The designators have been added to clarify connector identifications. Each

system cable segment is color coded and labeled with its unique designator, as well as with the name of the unit to which the segment should be connected.

NOTE-Continued

Cable segments are labeled with “P” (plug) and “J” (jack) designators as shown in the following example: “P1/J2,” where P1 indicates that the connector of that cable segment is plug #1; and J2 indicates the routing destination, jack #2, of the equipment/cable to which the cable segment is being routed. The installation instructions of this manual identify the equipment/cable to which each cable segment is to be routed.

- a. Remove the External System Cable from the transit case. Inspect the entire length of the cable, making sure there are no bare wires exposed, and that the cable has not been damaged in any way.
- b. Inspect connectors for dirt and/or damaged/missing pins.
- c. Replace and report damaged equipment, as required.
- d. Lay the External System Cable on top of the vehicle. Stretch it out and look for the segment labeled KSI (P3-green sleeve). (See Figure 2-13.)

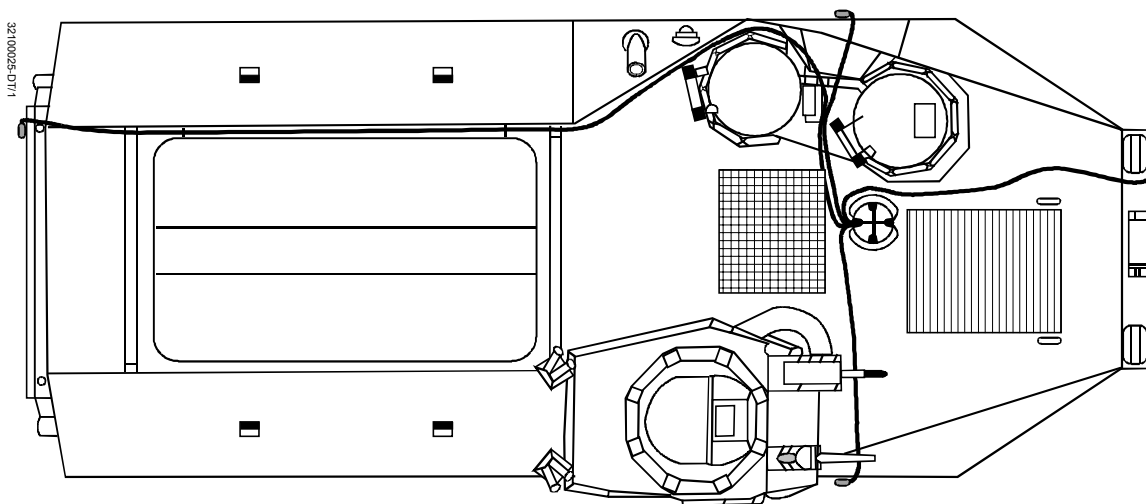
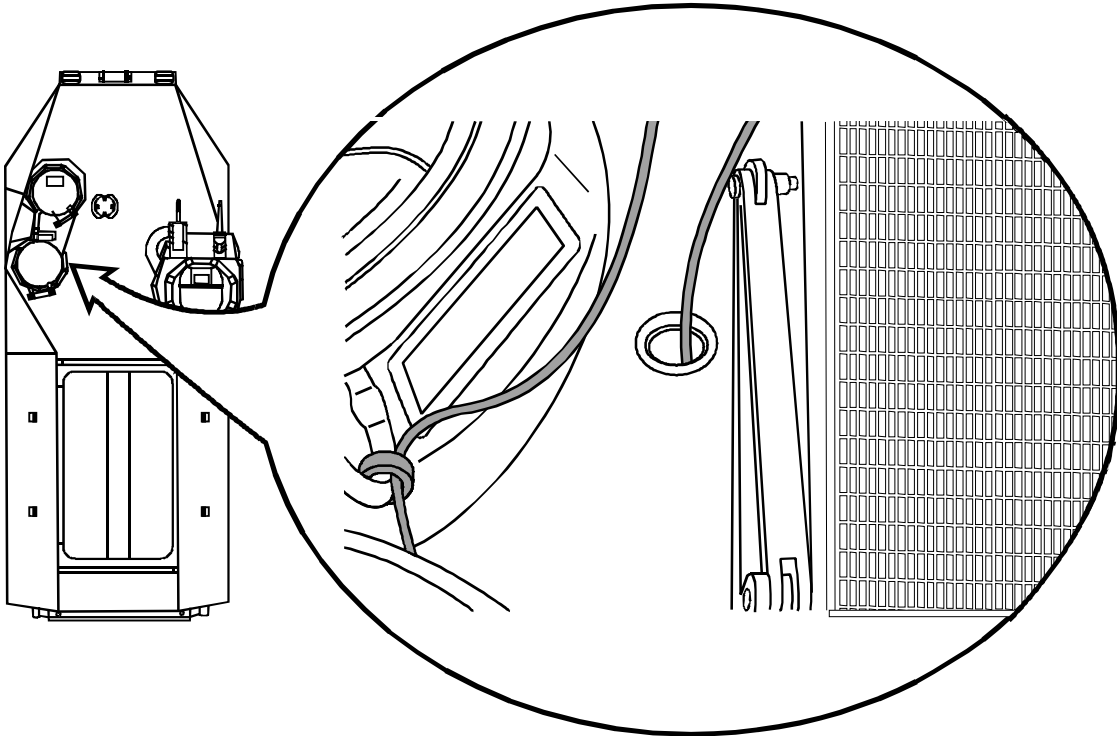


Figure 2-13. External Cable Routing.

- e. Route this segment (P3-green sleeve) to the KSI. Connect (P3) to (J1) of the KSI. (See Figure 2-11.)
- f. Locate the segment labeled Right Detector Belt (P4-white sleeve), and route this segment to the right side of the vehicle. Connect (P4) to (J1) of the Right Detector Belt.
- g. Locate the segment labeled Left Detector Belt (P5-white sleeve), and route this segment to the left side of the vehicle (by the hand/foot holds). Connect (P5) to (J1) of the Left Detector Belt.
- h. Locate the segment labeled Front Detector Belt (P6-gray sleeve), and route this segment under the left headlight. Connect (P6) to (J1) of the Front Detector Belt.

- i. Locate the segment labeled Rear Detector Belt (P7-gray sleeve), and route this segment to the Rear Detector Belt on the mounting bracket at the rear of the vehicle. (The connector of the detector belt will be on the left side of the bracket.) Connect (P7) to (J1) of the Rear Detector Belt.
- j. Route the segment labeled Internal Cable (P8-blue sleeve) through the opening (antenna hole) between the troop commander's hatch and the rear plenum. This segment will be connected to the Internal System Cable. (See Figure 2-14.)



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Figure 2-14. External/Internal Cable Routing.

- k. Secure all cables out of the way with fastener tape tie-wraps.

2.3.1.6 Control Unit.

- a. Remove the CU from the transit case, and inspect for cracks or broken display window and membrane switch damage.
- b. There should a strip of fastener tape on the back of the box. If this strip is not present, apply one using the same method used to apply fastener tape to the vehicle. Refer to paragraph 2.3.1.2.2 for fastener tape preparation.
- c. Inspect connector for dirt and/or damage.
- d. Replace and report damaged equipment, as required.
- e. Apply fastener tape to the left wall between the troop commander's station and the driver's seat underneath the air outlet valve.
- f. Mount the CU to the fastener tape on the wall of the vehicle, and ensure that it is firmly seated. (See Figure 2-15.)



Figure 2-15. Typical Control Unit Installation.

2.3.1.7 Power Controller.

- a. Remove the Power Controller from the transit case and inspect for damage.
- b. On the bottom of the box, there should be two strips of fastener tape. Refer to paragraph 2.3.1.2.2 for fastener tape preparation.
- c. Inspect connector for dirt and/or damage.
- d. Replace and report damaged equipment, as required.
- e. Apply fastener tape to the left wall between the troop commander's station and the driver's seat.
- f. Mount the Power Controller to the fastener tape on the vehicle, and ensure that it is firmly seated. (See Figure 2-16.)



Figure 2-16. Typical Power Controller Installation.

2.3.1.8 Internal System Cable. (See Figure 2-17.)

WARNING

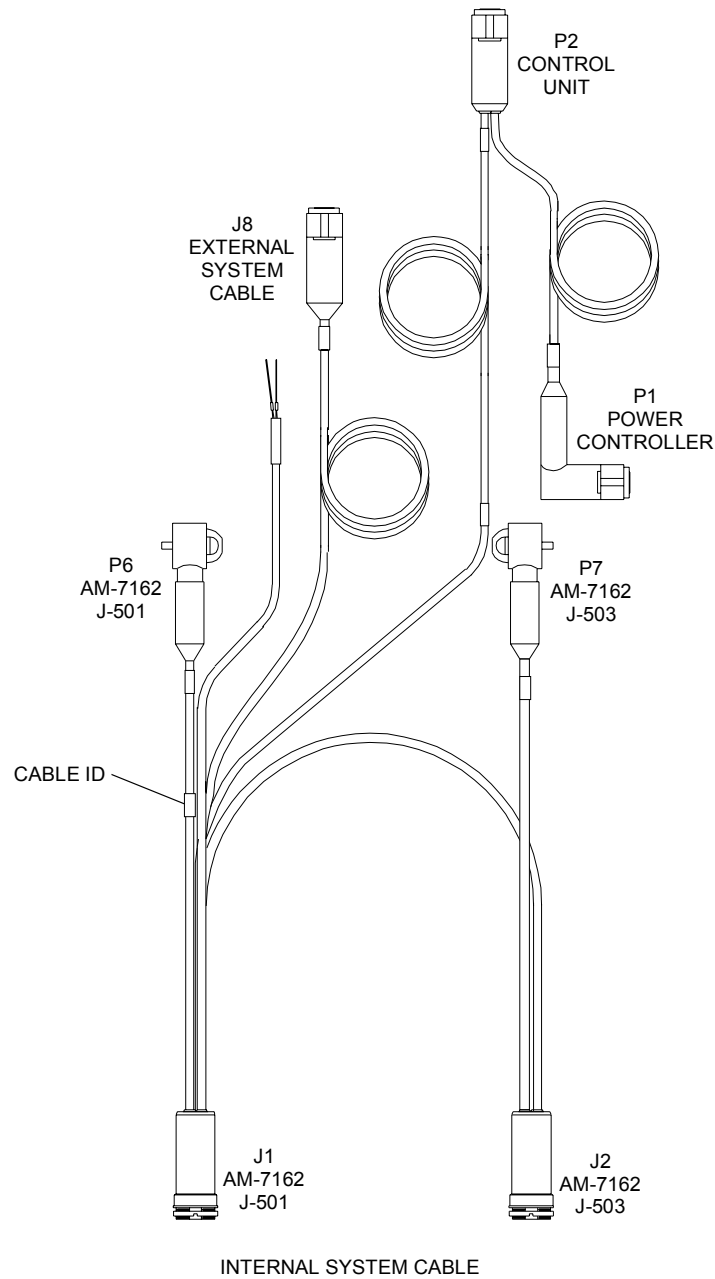
To prevent personal injury, turn all system power to the equipment off, including the CU, before conducting any removal/replacement procedures.

NOTE

Route the cables and connect them to the individual units, using fastener tape tie-wraps at intervals. Secure the cables safely out of the way.

Letter/number designators are shown in parenthesis. For example: (P3) or (J1). The designators have been added to clarify connector identifications. Each system cable segment is color coded and labeled with its unique designator, as well as with the name of the unit to which the segment should be connected.

Cable segments are labeled with “P” (plug) and “J” (jack) designators as shown in the following example: “P1/J2,” where P1 indicates that the connector of that cable segment is plug #1; and J2 indicates the routing destination, jack #2, of the equipment/cable to which the cable segment is being routed. The installation instructions of this manual identify the equipment/cable to which each cable segment is to be routed.



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Figure 2-17. Internal System Cable.

- Remove the Internal System Cable from the transit case. Inspect the entire length of the cable, making sure there are no bare wires exposed, and that the cable has not been damaged in any way.
- Inspect connectors for dirt and/or damage to pins.
- Replace and report damaged equipment, as required.
- Route the cable segment labeled External Cable (J8-blue sleeve) to the opening between the troop commander's hatch and the rear plenum, and connect to (P8) of the External System Cable.

CAUTION

When attaching connectors, ensure that the plugs and jacks are correctly keyed.
If misalignment occurs, damage to the pins may result causing BIT failure.

- e. Route the segment labeled AM-7162 J501 (P6-black), and the segment labeled Cable (J1-black) to the AM-7162 amplifier. Remove J501 and connect (J1) to the removed cable connector. (See Figure 2-18.)

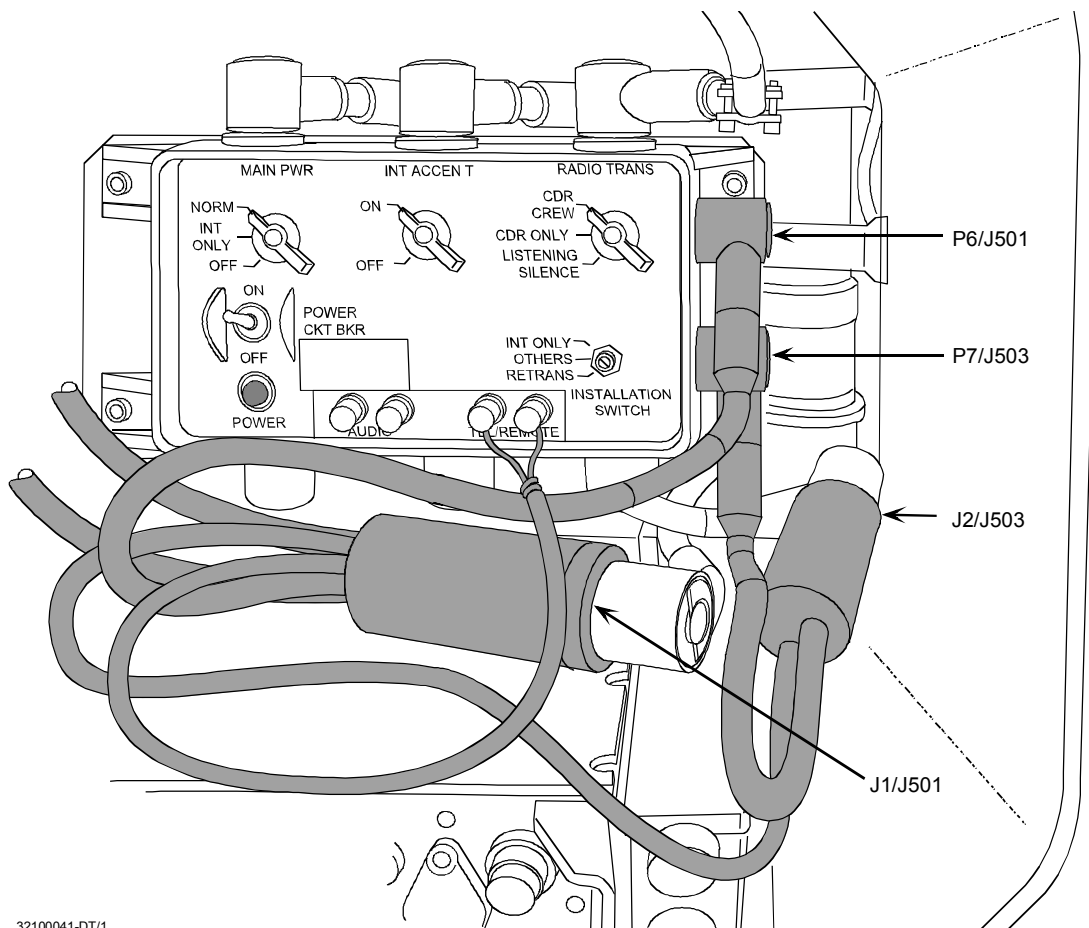
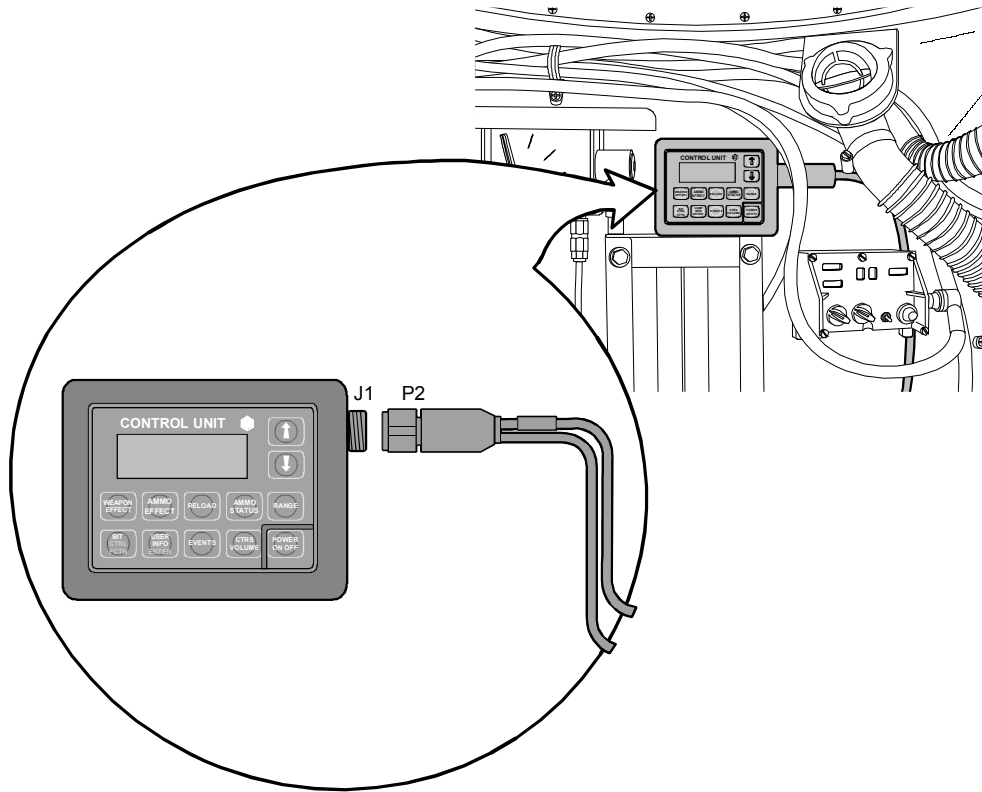


Figure 2-18. Internal Cable Routing.

- f. Route the segment labeled AM-7162 J503 (P7-black), and the segment labeled Cable (J2-black) to the AM-7162 amplifier. Remove J503 and connect (J2) to the removed cable connector.
- g. Connect (P7) to the J503 connector on the amplifier.
- h. Connect (P6) to the J501 connector on the amplifier.
- i. There will be two insulated wires that are stripped and tinned at the ends, attached to the Internal System Cable near the segments connected to the amplifier. Connect either tinned wire to the (-) REMOTE/TEL binding post, and the other wire to the (+) REMOTE/TEL binding post on the AM-7162.

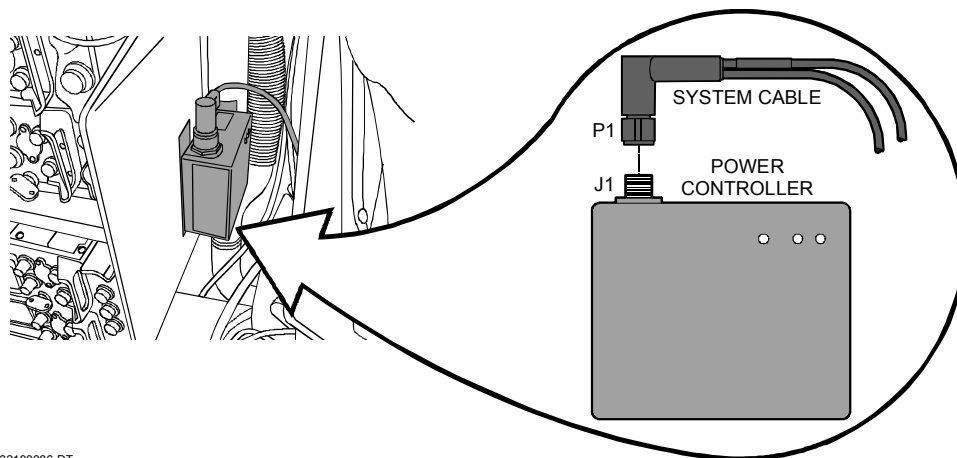
- j. Route the segment labeled Control Unit (P2-red sleeve) to the CU, and connect (P2) to (J1) of the CU. (See Figure 2-19.)



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Figure 2-19. Control Unit Connection to System Cable.

- k. Route the segment labeled Power Controller (P1-violet sleeve) to the Power Controller, and connect (P1) to (J1) on the Power Controller. (See Figure 2-20.)
- l. Secure all cables out of the way with fastener tape tie-wraps.



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Figure 2-20. Power Controller Connection to System Cable.

2.4 INITIAL ADJUSTMENTS, BEFORE USE, DAILY CHECKS, AND SELF-TEST REQUIREMENTS.

Before operating MILES 2000 equipment, perform the following:

- a. Ensure PMCS described in Section II have been performed.
- b. Perform the functional checks described in Section V.

2.5 OPERATING PROCEDURES.

NOTE

The M2 SAT must be Enabled by the gunners IWS. Refer to IWS Operator's Manual TD 23-7920-702-10. Boresight and fire the M2 machine gun using normal procedures.

NOTE

Ensure that the Power Controller is fully charged. A Power Controller near discharge will cause either BIT to continuously cycle when the system is powered up, or cause the system to continuously reset. Should this occur, turn off the CU, start the vehicle, and allow the Power Controller to recharge for 15 minutes, or replace the Power Controller.

2.5.1 Control Mode On Operating Procedures. Upon power up, the CU will come up with a vehicle status of "CHEAT KILL," and the KSI will flash continuously. The Controller can reset the vehicle status by setting the CD/TDTD (Controller Gun) for "reset" and firing at a detector on the vehicle. The KSI will flash once and then the vehicle intercom will sound with "reset." The vehicle may be made mission ready in one of two ways: 1) the controller can set up information for the vehicle and weapons type on the MILES After-Action Review System (MARS) computer, and upload the information to the CD/TDTD (Controller Gun), then upload the information to the vehicle via the optical port on the KSI; or 2) the controller can set the vehicle status to "Control Mode On," and the required information can be set from the MILES 2000 CU.

NOTE

Turn vehicle power on before powering up the MILES System. If vehicle power is not on, the MILES 2000 System will drain power from the Power Controller.

- a. Turn on the CU. MILES 2000 equipment should power up and automatically run BIT. Upon completion of BIT, the vehicle intercom will sound with "**Audio Check**," and will indicate whether BIT passed or failed.

NOTE

"Switch Test" will be displayed on the CU during BIT. Verify push buttons are working correctly.

- b. After the power on BIT completes, the system will be in a "Killed" state and will display: "CHEAT KILL POWER SOURCE TAMPER" for approximately 7 seconds. The KSI will continuously flash. Use the CD/TDTD (Controller Gun) to reset the system.
- c. Have the Controller Time Sync the system using a CD/TDTD (Controller Gun). Aim at any detector and pull the trigger. The KSI will flash twice.

NOTE

Use a CD/TDTD (Controller Gun) that has been Time Synchronized by another CD/TDTD (Controller Gun). This ensures that all the exercise units and CD/TDTDs (Controller Gun) have the same date and time.

- d. Set the CD/TDTD (Controller Gun) to Clear Events and place the CD/TDTD (Controller Gun) into the KSI optical port and pull the trigger.
- e. Press the EVENTS push button on the CU to verify that it has been cleared.
- f. Time Sync the system again using a CD/TDTD (Controller Gun). Aim at any detector and pull the trigger. The KSI will flash twice.
- g. Change the vehicle status to “Control Mode On” by setting the CD/TDTD (Controller Gun) accordingly. Aim at a detector and pull the trigger.
- h. The KSI will flash once, the CU should display, and the vehicle intercom will sound with:

**CONTROL MODE ON
(LIMIT 5 MINUTES)**

NOTE

Pressing any push buttons other than the following four will shut Control Mode Off: Up Arrow, Down Arrow, CTRL/FCTN (red label), and the Enter (red label) push buttons.

- i. With a vehicle status of “Control Mode On,” perform the following actions:

- (1) Press the BIT/CTRL FCTN push button on the CU.
- (2) The CU will display THE MAIN MENU:

**HOST PLATFORM
VEHICLE SIMULATED**

- (3) Move the cursor to “HOST PLATFORM” and press ENTER. The CU will display a list of vehicles.
- (4) Move the cursor to “VEHICLE” and press ENTER. The CU will return to the previous screen.
- (5) Move the cursor to “VEHICLE SIMULATED” and press ENTER.
- (6) The CU will display:

**DEFAULT VEHICLE
CUSTOM VEHICLE**

- (7) Move the cursor to “DEFAULT VEHICLE” and press ENTER. The CU will display a list of vehicles.

- (8) Move the cursor to the AAV-P7 selection and press ENTER. The CU will display the Threshold screen.
- (9) The CU will display a default threshold of 75. Press ENTER.

NOTE

Should the vehicle assess a Cheat Kill after a Mobility Kill due to crew movement, turret movement, engine vibration, etc.; ask the Controller to increase the vehicle's threshold level.

- (10) This returns you to the main menu.
- (11) Press the WEAPON SELECT push button on the CU. The CU will read "CONTROL MODE OFF," the KSI will flash once, and the vehicle intercom will sound with "Control Mode Off."

NOTE

Once AAV-P7 is selected as vehicle type, WEAPON SELECT, AMMO SELECT, RELOAD, AMMO STATUS, and RANGE push buttons are not applicable. If pressed, the CU will display:

NOT AVAILABLE

2.5.2 Console Display at Night or Limited Visibility.

- a. Press either of the Arrow push buttons on the CU. This will light the display for 3 seconds.
- b. Make your selection. Once a push button is pressed, the display will stay lighted for 7.5 seconds, (or for 7.5 seconds after the last push button has been pressed.)
- c. After the last key is pressed, and 7.5 seconds has elapsed, the display will return to the default screen. The display will then stay lighted for another 3 seconds.
- d. When BIT is run (from power on or initiated by the user), the display will stay lit during BIT.

2.5.3 Boresight Procedures. After completion of installation of MILES 2000 equipment, you must perform the following boresight procedure prior to firing the .50 caliber machine gun.

- a. Using the unit's boresight telescope, insert it into the M2 SAT mounting adapter boresight bushing.
- b. Then use normal boresight procedures.

SECTION IV. OPERATION UNDER UNUSUAL CONDITIONS

2.6 ASSEMBLY AND PREPARATION FOR USE UNDER UNUSUAL CONDITIONS.

2.6.1 Unusual Environment/Weather. MILES 2000 equipment is ruggedized to withstand extreme changes in temperature, terrain, and environment. Therefore, assembly and preparation in unusual environment/weather should only require the caution necessary to ensure the safety of the operators and other participants.

2.6.2 Fording and Swimming. MILES 2000 equipment is waterproof and ruggedized. Therefore, equipment transport which requires fording and/or swimming should only require caution necessary to safeguard operators and participants, and to maintain control and accountability of the equipment.

2.6.3 Emergency Procedures. MILES 2000 equipment requires no additional procedures for emergency situations, as the equipment has been developed to be used for training simulations encompassing a great variety of conditions and levels of threat.

2.6.4 Communications Override Procedures. In the event of a Catastrophic or Communication Kill, the external communications can be over-ridden for emergencies: (See Figure 2-21.)

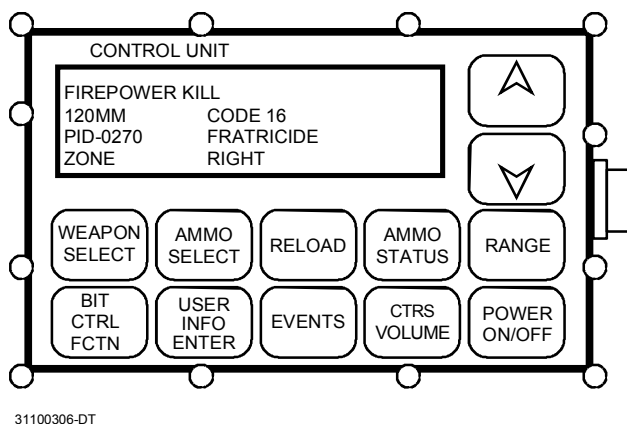


Figure 2-21. Control Unit (CU).

Press the USER INFO/ENTER push button, the CU will display:

■ XXX	YYMMDD	HHMMSS	XXXX =	PID
	COMMO	- DISABLED	YYMMDD =	DATE
			HHMMSS =	Time

Press the USER INFO/ENTER push button (toggle) to enable, the CU will display:

■ XXX	YYMMDD	HHMMSS
	COMMO	- ENABLED

SECTION V. FUNCTIONAL CHECKS

2.7 FUNCTIONAL CHECKS.

The functional check for MILES 2000 equipment is accomplished by the BIT performed by the CU. The CU will run the BIT, and the CU display screen will stay lighted during the test. Once the test has been run, the CU will display the results on the screen. Table 3-1 in Chapter 3, Section I, Trouble-shooting, contains the list of possible error messages the CU may display with MILES 2000 equipment.

2.7.1 Built-In-Test (BIT). To run the vehicle system BIT, perform the steps in Table 2-3.

Table 2-3. Built-In-Test (BIT).

ACTION	INDICATION
<p>Turn Control Unit (CU) on.</p> <p>“SWITCH TEST” will be displayed on the CU.</p> <p>Press the “WEAPON SELECT” push button on the CU.</p> <p>Press the “AMMO SELECT” push button on the CU.</p> <p>Continue to do the switch test until you are satisfied that the push buttons are working properly.</p> <p>To continue the BIT, simply stop pressing push buttons.</p> <p>Read results of BIT.</p> <p>Reset Vehicle with CD/TDTD (Controller Gun).</p>	<p>CU display should light and stay lighted throughout the test.</p> <p>MILES 2000 equipment should power up.</p> <p>Vehicle intercom sounds with “Audio Check,” then indicates BIT pass or fail. The KSI will flash continuously.</p> <p>CU will automatically begin the BIT.</p> <p>User may now test push buttons on CU to ensure the display is working properly.</p> <p>The display should read “WEAPON SELECT.”</p> <p>The display should read “AMMO SELECT.”</p> <p>The display should match the label of the push button being pressed. Arrow push buttons should read “UP” or “DOWN.”</p> <p>The unit will automatically continue the BIT without further command.</p> <p>The display will indicate the following:</p> <p>BIT PASSED - Indicates an operational system.</p> <p>or</p> <p>BIT FAIL (with error message) - All or part of the equipment has failed the BIT, or the equipment is not present or is not properly connected. Refer to Chapter 3, Section I, Table 3-1 for further action.</p> <p>then</p> <p>“CHEAT KILL POWER SOURCE TAMPER.”</p> <p>then</p> <p>KILLED - The equipment has suffered a Catastrophic Kill. Contact the Controller.</p> <p>after reset</p> <p>READY - The equipment has passed the BIT and the mission may be continued.</p>

CHAPTER 3 OPERATOR MAINTENANCE INSTRUCTIONS

SECTION I. TROUBLESHOOTING

3.1 TROUBLESHOOTING PROCEDURES.

Following are troubleshooting procedures for problems which may be encountered with the MILES 2000 AAV-P7 configuration. Operator troubleshooting procedures involve identifying a problem, and isolating the problem to the most likely piece(s) of equipment. Generally the BIT run by the Control Unit identifies most problems within the system, and produces an error message to let the user know that there is a problem. Table 3-1 lists the error messages that are available; the MILES 2000 equipment malfunction most likely to cause the error message; and the appropriate action to take to correct the problem. You may notice that, much of the time, the corrective action to be taken to resolve a problem is to remove the malfunctioning equipment, and replace it with a unit that is working. This is because the MILES 2000 is designed to need only limited maintenance at the operator and/or unit level. When the removal and replacement of equipment can be efficiently expedited, “downtime” can be cut dramatically, and participants can quickly return to the mission scenario, allowing them to receive maximum benefit from training. Removal and replacement procedures are located in this chapter in Section II, Operator Maintenance.

WARNING

To prevent personal injury, turn all system power to the equipment off, including the CU, before conducting any removal/replacement procedures.

You may encounter equipment problems not addressed in this section. If this is the case, notify the appropriate personnel (a supervisor and/or higher echelon maintenance personnel), as soon as possible.

Table 3-1. MILES 2000 Troubleshooting Chart for AAV-P7 Configurations.

PROBLEM	PROBABLE CAUSE(S)	ACTION
No power to MILES 2000 - No LEDs lighted on Power Controller.	Connection from internal system cable not secure or connectors damaged.	Check internal system cable connection at Power Controller, tighten if loose. Ensure connector is not damaged, and that there is no debris or foreign objects in connector.
	Power Controller	Check Power Controller. If no LEDs lighted, remove and replace Power Controller.
	Internal System Cable	If problem still exists, remove and replace Internal System Cable. If problem still exists, refer problem to higher echelon maintenance.
Battery Power Low - LED lighted on Power Controller (PN 146409-1).	Batteries not fully charged.	Remove and replace Power Controller.
BIT FAILURES	PROBABLE CAUSE(S)	ACTION
CU Memory	CU	Remove and replace.
CU	CU	Remove and replace.
CU Voice	CU	Remove and replace.
CU Display	CU	Remove and replace.
NVRAM	CU	Ask Controller to check settings for vehicle to ensure Pk tables are correct, and correct vehicle configuration is loaded. If problem still exists, remove and replace.
No KSI Commo	KSI	Check connections. Retest. If error is repeated, remove and replace.
KSI Memory	KSI	Remove and replace.
Strobe	KSI	Check connections. Retest. If error is repeated, remove and replace.
Belts/AMPL Noisy	Detector Belts	Remove and replace belt(s).
Front Belt	Detector Belts	Remove and replace.
Rear Belt	Detector Belts	Remove and replace.
Left Belt	Detector Belts	Remove and replace.
Right Belt	Detector Belts	Remove and replace.

SECTION II. OPERATOR MAINTENANCE

3.2 OPERATOR MAINTENANCE PROCEDURES.

Much of the operator maintenance for the MILES 2000 equipment consists of removing the defective item and replacing it with functioning equipment. Remove/replace procedures for the AAV-P7 configuration are included below:

WARNING

To prevent personal injury, turn all system power to the equipment off, including the CU, before conducting any removal/replacement procedures.

CAUTION

Equipment that is emerged in saltwater requires fresh water rinse to prevent equipment damage.

NOTE

Cleaning of MILES 2000 equipment requires no special procedures or the use of cleaning compounds/chemicals. Clean all areas, including the lens area by: (1) wiping dirt and dust away using a soft rag; (2) clean with a soft cloth rag dampened with water; and (3) polish to a brilliant luster with a finishing cloth.

The use of chemicals to clean MILES equipment, including the cleaning of lenses, is not recommended.

3.2.1 Remove/Replace Procedures for AAV-P7. Before conducting any remove/replace procedures, turn all power OFF.

3.2.1.1 M2 Small Arms Transmitter (AAV-P7) Removal.

- a. Loosen retainer strap of the SAT adapter from the trunion on the front of the turret.
- b. Remove the SAT and adapter from the trunion, taking care not to damage the equipment.
- c. Clean the equipment and adapter. Prepare for turn-in.

3.2.1.2 M2 Small Arms Transmitter Replacement.

- a. Inspect the mounting bracket. Make sure the SAT is securely mounted to the bracket.
- b. Slide the SAT and adapter over the trunion on the front of the turret, and secure the clip to the trunion.

3.2.1.3 Front Detector Belt Removal.

- a. Disconnect the External System Cable from the detector belt connector.
- b. Working with short sections, detach the detector belt from the fastener tape on the vehicle. Work carefully so that no electronics or wiring are damaged during removal.
- c. Clean equipment and prepare for turn-in.

3.2.1.4 Front Detector Belt Replacement.

- a. Working in short sections, press the detector belt against the fastener tape. Work carefully so that no electronics or wiring are damaged during replacement.
- b. Once the belt is installed, attach the External System Cable connector to the belt connector.
- c. Safely secure cable using fastener tape tie-wraps.

3.2.1.5 Rear Detector Belt Removal.

- a. Disconnect the External System Cable from the detector belt connector.
- b. Working with short sections, detach the detector belt from the fastener tape on the mounting bracket. Work carefully so that no electronics or wiring are damaged during removal.
- c. Clean equipment and prepare for turn-in.

3.2.1.6 Rear Detector Belt Replacement.

- a. Working in short sections, press the detector belt against the fastener tape on the mounting bracket. Work carefully so that no electronics or wiring are damaged during replacement.
- b. Once the belt is installed, attach the External System Cable connector to the belt connector.
- c. Safely secure cable using fastener tape tie-wraps.

3.2.1.7 Left Detector Belt Removal.

- a. Disconnect the External System Cable from the detector belt connector.
- b. Working with short sections, detach the detector belt from the fastener tape on the vehicle. Work carefully so that no electronics or wiring are damaged during removal.
- c. Clean equipment and prepare for turn-in.

3.2.1.8 Left Detector Belt Replacement.

- a. Working in short sections, press the detector belt against the fastener tape. Work carefully so that no electronics or wiring are damaged during replacement.
- b. Once the belt is installed, attach the External System Cable connector to the belt connector.
- c. Safely secure cable using fastener tape tie-wraps.

3.2.1.9 Right Detector Belt Removal.

- a. Disconnect the External System Cable from the detector belt connector.
- b. Working with short sections, detach the detector belt from the fastener tape on the vehicle. Work carefully so that no electronics or wiring are damaged during removal.
- c. Clean equipment and prepare for turn-in.

3.2.1.10 Right Detector Belt Replacement.

- a. Working in short sections, press the detector belt against the fastener tape. Work carefully so that no electronics or wiring are damaged during replacement.
- b. Once the belt is installed, attach the External System Cable connector to the belt connector.
- c. Safely secure cable using fastener tape tie-wraps.

3.2.1.11 Kill Status Indicator Removal.

- a. Disconnect the External System Cable from the KSI connector.
- b. Remove the four bolts securing the KSI adapter to the ventilator aspirator.
- c. Remove the KSI adapter from the ventilator aspirator, taking care not to damage the equipment. Secure the four bolts to the ventilator aspirator.
- d. Clean equipment and prepare for turn-in.

3.2.1.12 Kill Status Indicator Replacement.

- a. Remove the four bolts from the ventilator aspirator, but keep them with you.
- b. Match the KSI adapter mounting holes to the bolt holes in the ventilator aspirator.
- c. Secure the KSI adapter to the ventilator aspirator with the four bolts.
- d. Connect the system cable to the KSI connector.

3.2.1.13 Control Unit Removal.

- a. Disconnect the system cable from the CU.
- b. Detach the CU from the vehicle fastener tape, taking care not to damage the equipment.
- c. Clean the equipment and prepare for turn-in.

3.2.1.14 Control Unit Replacement.

- a. Apply fastener tape to the CU, if there is none.
- b. Mount the CU to the vehicle.
- c. Connect the System Cable to the CU connector.

3.2.1.15 Power Controller Removal.

- a. Disconnect the System Cable from the Power Controller.
- b. Detach the Power Controller from the fastener tape on the vehicle, taking care not to damage the equipment.
- c. Clean the equipment and prepare for turn-in.

3.2.1.16 Power Controller Replacement.

- a. Apply fastener tape to the bottom of the Power Controller, if there is none.
- b. Attach the Power Controller to the fastener tape on the vehicle.
- c. Connect the System Cable to the Power Controller connector.

3.2.1.17 System Cable (all system cables) Removal.

- a. Disconnect cable from all units and other cables.
- b. Detach the System Cable from the fastener tape, securing it to the vehicle.
- c. Remove the cable, taking care not to damage the cable or connectors.
- d. Clean the cable and prepare for turn-in.

3.2.1.18 System Cable (all system cables) Replacement. Replace the cable using the installation instructions in Chapter 2, Section III, applicable to the type of System Cable.

3.3 DISASSEMBLY PROCEDURES FOR AAV-P7 CONFIGURATIONS.

- a. Disconnect the System Cables, and remove them and all MILES 2000 equipment in accordance with the removal procedures in Section II, paragraph 3-2, of this chapter.
- b. Clean and inspect equipment. If there is any damage to the equipment, report damage on the appropriate form (a separate form for each piece of equipment), and turn in with damaged equipment.
- c. Place equipment and System Cable(s) in the transit case.

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